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A REVIEW OF THE AVAILABLE LITERATURE ON THE PHARYNX AND PHARYNGEAL SURGERY FOR 1939.

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ANATOMY.

Baker[1] describes the anatomy of the pharynx as divided into three portions: nasopharynx, oropharynx and laryngopharynx. Waldeyer's ring is located in the naso- and oropharynx. The adenoid is a lymphoid mass located principally in the nasopharynx, usually in the midline, but frequently extending to cover the posterior nares and obstruct the Eustachian orifices. The nasopharynx has a rich blood supply and the lymphatics are plentiful. The lymph vessels drain either into the retropharyngeal glands or into the posterior or external group of the deep lateral chains in the neck. The retropharyngeal glands lie between the pharynx and the aponeurosis covering the bodies of the first three cervical vertebrae. These glands drain the sinuses, ear and nose, thus explaining the cases of cervical arthritis and retropharyngeal abscess. In the oropharynx are seen small scattered masses of lymph tissue, sometimes in the midline but mostly along the side walls just posterior to the posterior pillars. Also, here are found the faucial tonsils, located between the two pillars. The tonsils are encapsulated by a squamous epithelial lining which dips into and lines the crypts or channels. The blood supply of the tonsil comes from the branches of the maxillary, pharyngeal and lingual arteries. The lymph drainage is

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principally into the "tonsil gland" which lies just under the anterior border of the sternomastoid muscle. This in turn drains into the lymph glands of the neck, which lie as a sort of collar around the upper part of the neck and extends down as an inverted triangle along either border of the sternomastoid muscle. The lingual tonsil lies at the base of the tongue. It is usually flat but may be swollen to twice its size. Waldeyer's ring is believed to play a part in the protective mechanism of the lower respiratory passages against infection. There are three protective agencies in the upper air passages: the mucous membranes, the cilia and Waldeyer's ring. The importance of the lymphoid tissue in protection cannot be underestimated. Cervical glands that were clinically and microscopically normal have been found to contain pyogenic organisms; however, not only does this lymph tissue serve as a line of protection, it may also act as a focus of infection. The extreme vascularity favors the rapid absorption of toxic materials. Infective organisms readily penetrate the capsule of the tonsil, in fact the peritonsillar space is usually infected first, and then the gland itself follows. Workers have found the same organisms in joint affections as are found in the tonsil at the same time. It has been shown that in juvenile rheumatism, the destruction of the pharyngeal follicles by infection is followed by a definite lowering of the sedimentation rate and a marked improvement of symptoms. When these glands lose their function as a result of repeated infection, it is then that they become potential foci of infection for the patient. If deemed necessary there should be a complete adenoidectomy and tonsillectomy. Recurrence of either may be just as much a menace as the original tissue. The treatment, surgically and medically, narrows down to the idea of complete removal of pockets containing bacteria which lie dormant and feed infection into the system.

PHYSIOLOGY.

Since it is admitted that lymphatic absorption from the nasopharynx and the rôle of the cervical lymphatic pathways are matters of growing moment in view of our increasing knowledge of the significance of viruses in causing nervous and respiratory diseases, McCarrell[2] attempted a study of the absorption of Ringer's solution and distilled water by the naso-

pharyngeal lymphatics. A standardized method for producing a flow of cervical lymph in anesthetized animals has been developed. It consists of regular passive motion of the head, which causes an even flow of lymph without the disadvantages of the massage technique. The results of the experiment showed that the absorption during nasopharyngeal perfusion of Ringer's solution is too small to be quantitatively measured. With distilled water, extensive lymphatic absorption resulted, with consequent dilution of the cervical lymph.

INFLAMMATORY DISEASE OF THE PHARYNX.

An epidemic of vesicular pharyngitis occurring at a summer camp in New Hampshire is reported by Levine, Hoerr and Allanson.[3] The three main features of the disease were: vesicular throat lesions, high infectivity and a benign self-limited course. The onset was sudden, with headache, malaise, sore throat and fever. The throat showed areas of one or more raised vesicles, 1 to 2 mm. in diameter, surrounded by a red areola. The lesions were most commonly in the region of the faucial pillars, tonsils and soft palate. While some of the vesicles eventually ulcerated, many remained in the vesicular state or a period of between five to 10 days before disappearing without other incident. In no case were there any severe constitutional reactions and the general physical examination was consistently negative. The age incidence varied from seven to 67, but the younger age group was more commonly affected. The incubation period appeared to be between five to seven days. Laboratory examinations, including routine cultures, blood count and blood cultures, were not significant. Because of the appearance of the pharyngeal lesions and because four of the patients developed herpes zoster auricularis following the epidemic, it was considered that the disease was of herpetic origin, experimental proof, however, not being present.

Long, McKhann and Cheney[4] took cultures for 10 months from the nasopharynx of each child on admission to the Infants' Hospital, of Boston. It was appreciated that the organisms found in the noses and throats of patients suffering from upper respiratory infections might not in themselves be the causative agents of infections, particularly in infection of the upper respiratory tract where the etiological

agents are accepted to be ultra-microscopic filter passing viruses; however, it was felt that these viruses might result in the activation of organisms already present. There was a definite seasonal variation, in that there was a pronounced increase in the number of pathogenic and nonpathogenic organisms throughout the winter months. In children suffering with pneumonia, types VI and XIV were found to be most prevalent. Only a few organisms were found in the nasopharynx of patients not having active pneumonia. The authors believe that pneumococus types VI and XIV are the most frequent types of organisms found in normal healthy adults and that due to the low carrier rate among infants, serious disease of the respiratory tract in these patients may be presumed to be due to infections derived from adult carriers, rather than to follow invasion by organisms previously carried. They reason therefore that partial prevention of infection in infants might be achieved by diminishing the number of adult contacts and by the institution of better methods of interrupting direct transmission of nasopharyngeal organisms from mother or nurse to infant. The incidence of hemolytic streptococci was found in only 29 out of 322 cultures. Nineteen of the 29 strains found in cultures were from patients suffering from an infection of the respiratory tract.

By way of introduction to his subject of streptococcal pharyngitis Scholes[5] discusses the disease-producing streptococci. They all fall into one large group, differing in degree only in their toxigenic and invasive qualities. The most important member of this group is the streptococcus pyogenes which shows B-hemolysis on blood agar. Some of the varieties of the disease-producing streptococci become pathogenic only under exceptional circumstances. The throat is considered the natural soil for pathogenic streptococci and it acts as a focus from which all streptococcal disease spreads either directly or indirectly, except in instances where the portal of entry is created by trauma. The incidence of disease depends upon several factors: *1.* the toxigenic and invasive qualities of the bacterial strain; *2.* the dosage of bacteria; *3.* the antitoxic and other protective factors of the host; and *4.* the position and character of the tissues invaded. Tonsillar infections by streptococci are divided into nine varieties, ranging

from simple infection with no local symptoms to fulminating cases with fatal results in a very short time. Among the violent infections, the author cites a case in which death resulted in 24 hours, and yet there was no evident inflammation of the throat and no exanthem. In this patient, any attempt to respond to the infection was unsuccessful. He feels that had there been better protective powers, the streptococci would have produced scarlet fever. The discussion of the complications is likewise complete and of particular interest in this section is that which deals with nephritis. It is pointed out that this complication is unusual in scarlet fever when the patient has a bright rash; while in cases with a mild onset and faint exanthem, nephritis is apt to develop, the supposition being that the resistance and reaction to the infection is inadequate to form sufficient antitoxin.

Hoople[6] cautions against error in evaluating the results of therapy. This is often due to differences of technique, lack of proper controls, individual variations of patients and diagnostic mistakes. In acute pharyngitis he does not recommend the use of sulfanilamide routinely but prefers to use the drug only in selected cases. Sheplar, Spence and McNeal[7] present case histories of 30 patients suffering from severe otolaryngologic infections due to hemolytic streptococci. All were treated with antistreptococcus serum, together with other therapeutic measures, including transfusions, sulfanilamide and bacteriophage—there were seven deaths and 23 survivals. In this series it was found that the early use of serum was of great value even in advanced and desperate infections. Because of the great efforts in administration and the excessive expense involved, the authors recommend the reservation of serum therapy for the more difficult cases. The timely use of modern biological and chemotherapeutic agents for the control of infections caused by hemolytic streptococci may be expected to reduce to a large extent the need for surgical procedures for the control of such infections; and even after surgical incision, to contribute to the reduction of postoperative mortality and morbidity. Meyer[8] advocates the use of radium and X-rays in inflammatory conditions of the nasopharynx and the tonsils. His recommendation is based on the effect of irradiation in reducing and even destroying lymphoid tissue, and upon its effect in ameliorating inflammatory reac-

tion. When small fields are used, the two sides of the neck being alternately subjected to the rays, there is a gradual regression of the tonsil without severe reaction in the skin and mucous membrane. This form of therapy has been found satisfactory in acute inflammation and chronic tonsillitis where surgical removal is contraindicated. It may also be employed in the case of streptococcal or diphtheria carriers.

Fenton[9] finds sulfanilamide of especial value in the management of streptococcus infections of the upper respiratory tract. He states that the required concentration of the drug in the body must be maintained day and night, and in order to obtain this result, the administration must be continued throughout the 24 hours. He feels that 5 to 10 gr. every four hours are sufficient for streptococcal, and 10 times as much is required for pneumococcal infections. Complications from the use of the drug have been agranulocytosis, hemolytic anemia, cyanosis, purpuric and scarlatinaform rashes, dermatoses, peripheral neuritis, sulfhemoglobinemia and a moderate decrease in the white and red cell counts. These symptoms decreased when the drug was continued. It is desirable to check the blood findings at least every 48 hours.

RETROPHARYNGEAL ABSCESS.

The earliest mention of retropharyngeal abscess was made by Platerus in 1652. Grodinsky[10] presents a brief historical review of this condition. Retropharyngeal abscess may involve the space between the pharyngeal wall and the visceral fascia; the space between the visceral fascia and the alar fascia; or that space between the alar and the prevertebral fascia. An infection of the retropharyngeal region may, therefore, remain localized to the visceral space or it may extend to the other spaces mentioned; furthermore, it may migrate to the superior, the posterior mediastinum or to the lateral pharyngeal space. Lateral pharyngeal abscess, originating as such, may likewise spread to the retropharyngeal area. Acute abscesses in these locations are more often seen in young children and they are usually secondary to infections of the nose, throat or ear. They reach these areas by direct continuity, venous or lymphatic drainage. The common pyogens, according to Koplik, are the most frequently responsible organisms. The clinical picture of mild or severe

infection of the ear, nose or throat, followed by pain, dysphagia, chills and fever, with signs of internal bulging of the pharyngeal wall should furnish a clue as to the possible course of events. Extension of the process to the mediastinal spaces is indicated by chest pain, dyspnea, persistent fever and Roentgenographic evidence of mediastinitis. Rimer[11] urges the employment of the time-honored palpating finger in all cases of dysphagia and dyspnea with cervical adenitis. In two series collected, the mortality in the first group was about 30 per cent; in the second, 0.06 per cent. The difference is explained by early diagnosis of the condition in the latter series.

The complications of throat infections, according to Waldapfel,[12] are grouped as follows: *1.* The hematogenous form, in which the infection passes directly into the circulation without involvement of the regional nodes and without abscess formation; *2.* the lymphogenous form, in which the infection of the blood stream may arise from the infected nodes or abscess of the tonsil, causing periphlebitis or thrombophlebitis; and *3.* the phlegmonous or interstitial form, in which the parapharyngeal spaces are invaded, with the infection extending either upward toward the brain or downward toward the mediastinum. In this form the veins may or may not be invaded. A series of cases is presented in which inflammatory swelling in the neck followed infection of the throat. While infections of this nature may be severe, it is not necessarily so. The swelling varies from the size of a plum to that of a small apple. It is usually rather hard, slightly painful to the touch and generally adherent to the overlying skin. Fluctuation is not always present. The tonsils do not show an acute process or any evidence of the origin of the infection. The pharynx is usually asymmetric because of the swelling of the lateral portion. The temperature in these cases is not significant. Local symptoms consist of pain in the ear, dysphagia and limitation of motion of the head. The treatment at first is expectant. Should laryngeal edema, chills, sudden rise in temperature or marked spread of the infection occur, surgical intervention becomes necessary. The external approach should be used.

Gilmore[13] presents a case of thrombosis of the internal jugular vein with symptoms of septicemia secondary to lateral

pharyngeal abscess. The probable route of infection was hematogenous, beginning in the tonsillar vein and spreading retrogradely to the jugular by way of the facial vein. Once the diagnosis is established, the therapy is surgical. While it is usually recommended that the sigmoid sinus be explored if need be, in this case it was not done, even though free bleeding was not encountered from the upper end of the vein when the diseased portion was resected.

A patient, age 15 years, suffering from sore throat for three months, consulted Etter.[14] The condition appeared to be a cervical adenitis of the left anterior cervical nodes. The patient was treated for acute tonsillitis for five days and discharged. Two days later, he returned with a spontaneously draining peritonsillar abscess. One week following, he returned for treatment of a subacute pharyngitis, and was discharged two days later. During the following month, he began to complain of swelling of the neck, sore throat and malaise. Examination disclosed a large, indurated mass to the left of the thyroid cartilage. Marked stiffness of the neck and dysphagia were present. The swelling was interpreted as being due to cervical adenitis secondary to the previous infections. With conservative treatment, the swelling subsided. One week later, an area of softening developed. This was incised and drained. Several days later another fluctuant area appeared medial to the first, and this was also incised and drained. This medial area persisted as a chronically infected sinus. About two weeks later, examination revealed what appeared to be vegetable matter protruding from the region of the first incision. This was removed and found to be the head of a stalk of June grass. According to the history, the object had at no time produced tickling or local irritation.

At least as unusual a cause of disease in this neighborhood is a case reported by Fort and Brown.[15] A patient, age 17 years, complained of sudden hoarseness, sore throat and hemoptysis. The temperature was 101°. Blood was seen coming down from the nasopharynx, and on direct examination, by elevating the soft palate, an ulcer was observed in the region overlying the first vertebra. On palpation, a sharp prominence was felt which moved as the atlas was moved. X-ray examination showed an anterior curve to the cervical spine, with a prominent projection of the tubercle of the atlas into

the posterior pharynx. With rongeur and curettes, the projection was smoothed. The recovery was uneventful. After examining many lateral Roentgenograms of the neck, the authors found many prominent tubercles, but in no case was there a history of a similar complaint. A review of the literature failed to yield a like manifestation.

RHINOPHARYNGITIS MUTILANS.

Sekine and Yokoo[16] report 12 cases of rhinopharyngitis mutilans, sometimes called gangosa. The writers report five cases in which the actual cause was frambesia tropica. In typical cases the face is greatly distorted by the formation of scars; the external nose, septum and turbinates undergo varying degrees of destruction, leaving the passages narrow as the result of contracture. In advanced cases the hard palate suffers necrosis, teeth fall out and the soft palate adheres to the posterior and lateral pharyngeal wall. The disease occurs most frequently after middle life.

TUBERCULOUS PHARYNGITIS.

Fox and Wigglesworth[17] report on 55 cases of tuberculous pharyngitis and laryngitis treated by topical application of cod liver oil as recommended by Banyai. The method consists of spraying plain U. S. P. cod liver oil over the diseased areas three times a day, about an hour after each meal. Of the 55 cases, 40 were laryngeal, and 15 pharyngeal. Only two cases were purely pharyngeal. Special attention was given to the appearance of the lesion, change in the voice, character of the cough, severity of pain, dysphagia and weight curve. The results compared favorably with those of Banyai. Ulcerative lesions responded well. In cases where the pain was intense, the oil appeared to have a definite analgesic effect. It is believed that the action is largely mechanical.

LYMPHOCYTIC CHORIOMENINGITIS.

MacCallum and Findlay[18] present a case that was admitted to the hospital with a diagnosis of anterior poliomyelitis with flaccid paralysis. Spinal fluid and nasopharyngeal washings were injected intracerebrally into 12 mice and three guinea pigs. All animals died and the virus of lymphocytic choriomeningitis was found in culture. This was checked to exclude

the possibility of a mixed infection with the virus of anterior poliomyelitis, and the nasopharyngeal washings of the patient were injected into three monkeys, who died, and again the virus of lmphocytic choriomeningitis was found, but no pathological evidence of anterior poliomyelitis could be determined. The authors state that this is the first time, as far as they know, that the virus has been isolated from the nasopharynx. It was still present in the nasopharynx 12 weeks after the onset but not demonstrable in the spinal fluid after the eighth week.

ROENTGENOGRAPHIC EXAMINATION OF THE PHARYNX.

The Roentgenographic anatomy of the pharynx and the larynx and also the physiological movements of these organs in normal and pathological conditions are presented by Shannon and Veitch.[19] O'Bannon[20] states that in the lateral projection, using a soft-tissue technique, all of the component organs from the nasopharynx to the trachea, as well as the various anatomical spaces contained therein, can be easily identified. Malignant tumors of the pharynx and the larynx appear as irregular thickenings of the outlines of the involved region. The extent of the tumor can be readily determined. This is especially important in locating the inferior border, which very often cannot possibly be ascertained by direct visualization of the lesion. Pfahler[21] urges Roentgenograms with and without barium, and suggests that the barium should be moved around in the mouth and then swallowed, so as to fill in all of the crevices and lateral spaces. He also feels that in lateral views, one film should be taken with the tissues relaxed and one in forced expiration. Anteroposterior positions are important in obtaining information concerning the valleculae and pyriform sinuses. Both of the above, as well as Muslow,[22] stress the importance of Roentgenograms not only as a permanent record of the location and extent of the disease or growth but also as a means of observing the progression or regression during irradiation therapy. O'Bannon[20] points out that the retropharyngeal soft-tissue space is relatively thin in the adult. In retropharyngeal abscess, this space is decidedly increased in thickness. If the abscess is the result of perforation by a foreign body, the foreign body may be identified. Muslow[22] shows the advantage of Roentgeno-

graphic study in these cases, particularly when mediastinitis becomes a complication.

CHOANAL ATRESIA.

In an excellent article, Morganstern[23] reminds us that congenital atresia of the postnasal orifices is due to the failure of normally occurring embryonic structures to disappear. The theories of its formation ascribe it to: *1.* the persistence of the bucconasal membrane; *2.* the persistence of the buccopharyngeal membrane; and *3.* the overgrowth of the horizontal and vertical processes of the maxillae. While unilateral choanal atresia is rare, congenital bilateral occlusion is even more rarely reported because it often results in death from asphyxia at birth and thus remains unrecognized. Goodyear[24] calls attention not only to its infrequent occurrence but states that when it does occur it is fraught with difficulties. Surgical opening of the bony occlusion is accomplished by punch forceps or dental burrs. Numerous ingenious devices have been tried postoperatively in an effort to maintain the patency of the surgically created opening. Morganstern[23] advocates the use of electrocoagulation because of its accuracy and simplicity of application. He reports a case successfully operated upon by this method and strongly advocates coagulation as the method of choice. Goodyear[24] reported a case of membranous atresia of the nasopharynx following scarlet fever. He was able at the time of the operation to produce a flap of mucous membrane, which was placed against an unbroken surface of the posterior pharyngeal wall. He obtained excellent results.

[Two cases, one of unilateral congenital atresia, the other of bilateral congenital choanal atresia, have been operated upon and are now under observation. The method was that advocated by Morganstern. The bony atresia was partially destroyed by punch forceps and burrs, followed by electrocoagulation. It has been necessary to repeat the coagulation of the orifice, and from present indications the results will be all that could be desired.—ED.]

PHARYNGEAL DIVERTICULUM.

Pulsion diverticula, according to Watt,[25] occur four to five times more commonly in men than in women, and are found

between the ages of 40 to 60 years. Harrington[26] reminds us that diverticula may occur in almost any part of the esophagus. They are divided into two main groups, the pulsion and the traction types. Traction diverticula usually occur in the median and lower third of the esophagus, and only rarely do they give rise to severe symptoms. Pulsion diverticula are most commonly situated in the hypopharynx, near the pharyngoesophageal junction, and usually the symptoms of this type are referable to the esophagus. Pulsion diverticula are the more common in the pharynx. They are usually located on the posterior wall just to the left of the midline of the pharynx. They are found at the site of some muscular deficiency between the inferior constrictor and the cricopharyngeus. They actually represent herniations of the mucous and submucous coats of the pharynx, which may possibly be due to a congenital defect, to neuromuscular inco-ordination during swallowing, to increased pressure on the posterior part of the pharynx or to areas of muscular deficiency at the point of entrance of nerves and vessels through the posterior pharyngeal wall. It is most probable that muscular deficiency is the predisposing cause and that the other factors act as the inciting cause. Harrington[26] reviewed the clinical manifestations of 225 cases of pharyngoesophageal diverticula which were eventually operated upon. In 85 per cent, the symptoms were vague and indefinite at the onset. Marked symptoms required one to 18 years to develop. In the remaining 15 per cent of the cases, the symptoms were more rapid in their progress and severity. The difference in the progress of early symptoms seems to be related more to the character of the neck than to the size of the sac. In many cases it was found that relatively small diverticula with small openings produced most disabling symptoms, while large diverticula with large openings produced little disability because of the ease with which the sac could be emptied; however, in both types it was found that the larger the diverticulum the greater the severity of the symptoms, esophageal obstruction being not uncommon. Harrington,[26] Shephard[27] and Watt[25] are unanimously agreed that dysphagia is the earliest symptom. The patient complains of the sensation of a foreign body and that food sticks in his throat. Later, there is regurgitation of food and mucus, noisy deglutition and a sensation of fulness in the throat. Harrington describes the early attempts of

surgical treatment of diverticula and states that von Bergmann performed the first successful operation in 1892. In 1909, Freiberg introduced the two-stage operation with marked reduction in mortality. Harrington further discusses the relative merits of the one-stage and the two-stage operations, and reports on a series of cases done by both methods. In properly selected cases, he expresses preference to the one-stage operation. In the two-stage method, a temporary diverticulopexy is done and the sac removed seven to 10 days later. The fundamental difference in the two operations is that in the one-stage procedure, the fascial planes leading into the mediastinum are not walled off preliminary to the removal of the diverticulum. The method of approach in both methods is the same: from the side of the neck on which the diverticulum is located, usually the left. Shepard advocates passing of the "string-guide" as a safe means of dilatation and describes his procedure in cases of diverticulum. He further describes a special technique developed for the correction of these diverticula. An angled clamp is applied to the neck of the diverticulum distal to two guy-sutures previously placed. The sac is removed with cautery and the edges inverted by means of the sutures.

PREVENTION OF DEAFNESS.

Early recognition of deafness in children, according to Crowe,[28] is very important, for most adult deafness has its beginnings in early childhood; and the earlier the conditions causing it are recognized and proper treatment initiated, the better the chance to prevent deafness. The chief offender is hypertrophic and hyperplastic lymphoid tissue found in and around the orifice of the Eustachian tube, causing partial obstruction and consequent impairment of hearing.

The work of Crowe and Baylor[29] on the prevention of deafness was carried out at Johns Hopkins over a period of 15 years. The plan of investigation was a strict adherence to the correlation of impaired function of hearing as determined by clinical tests with the nature and location of the causal lesion. Fifteen thousand records of hearing tests illustrating every type and degree of deafness have been made. An audiometer with a range of tones from 32 to 16,384 d.v., supplied by the Bell Telephone Laboratories, was used. It was soon

apparent as a result of these tests that impaired hearing for high tones is very common in children, as well as in adults. The fact that some children regained their hearing for high tones after removal of enlarged tonsils and adenoids throws some doubt on the classic teaching that "impaired hearing for high tones with good hearing for low tones is indicative of an inner ear or nerve deafness." Since hearing did not always improve after operation, an examination of the upper air passages, Eustachian tubes and nasopharynx was performed in those who failed to improve. In some cases it was necessary to employ avertin with amylene in order to use the nasopharyngoscope. Examination of those children who failed to improve after tonsillectomy and adenoidectomy revealed a state that is commonly referred to as granular pharyngitis associated with an overgrowth of lymphoid tissue in and around the Eustachian tubes. This abnormal growth partially obstructs the tubes, causes a hypersecretion of mucus, which further impairs function and produces chronic irritation of the tubes and middle ears. The earliest symptom of this partial obstruction is impaired hearing for the tones between 10,000 and 16,000 d.v. Good hearing in the middle of the scale, from 250 to 3,000 d.v., is, therefore, not affected at this early date. If untreated, the deafness progresses, involving one octave after another toward the low end of the scale, and deafness for ordinary conversation finally becomes apparent. It is surgically impossible to eradicate this lymphoid tissue without damaging the Eustachian tubes. On the basis of Heineke's observation that lymphoid tissue is more susceptible to irradiation than the adjacent epithelium, muscle and bone, patients falling into this class were treated postoperatively by X-ray and radium, the former being applied through the angle of the jaw, and the latter by means of an applicator passed along the floor of the nose under the direct vision of the nasopharyngoscope. The applicator is made of flexible steel wire threaded for the attachment of a piece of brass tubing 1.5 cm. in length, closed at one end and having a wall thickness of 1 mm. The tube containing the radium is placed a few millimetres away from the area to be treated; it is never placed into the end of the Eustachian tube. From 2 to 2.5 gram-minutes on each side of the nasopharynx are used at intervals of a month to six weeks. If the hyperplastic lymphoid tissue in the nasopharynx is too diffuse, X-ray ther-

apy consisting of a total of 500 r's. is given in six doses at four-day intervals.

The authors have shown that the most common type of middle ear deafness in adults begins in childhood, between the ages of 5 and 10 years, due to partial obstruction of the pharyngeal ends of the Eustachian tubes by hyperplastic lymphoid tissue. This produces impaired hearing for high tones with relatively good hearing for low tones, retraction of the drums and sometimes a total loss of hearing by bone conduction.

MISCELLANEOUS.

The method of obtaining sputum from infants and children by the use of the so-called laryngeal swab is considered quite unsatisfactory by Auger.[30] It is often necessary to obtain more than one specimen before one is sure of the predominating organism, and sufficient sputum for a direct smear examination is uncommon. The suction method can be used to obtain sputum from either the larynx or the nasopharynx. The author states that sputum from the nasopharynx is best suited for typing pneumococci. The laryngeal method consists of aspirating sputum from the throat while the child coughs. The apparatus consists of an ordinary glass 50 cc. syringe, a two-inch piece of soft rubber tubing, with a small hole cut in one side (so that the thumb can easily cover the hole and thus act as a valve), a two-inch piece of glass tubing and a three- to four-inch piece of slightly curved stiff rubber tubing or catheter. The soft rubber tubing is slipped over the tip of the syringe and is connected to the catheter with the short glass tube. When assembled, it consists, then, of a catheter to enter the child's throat, a glass tube connection for the observation of the sputum, a valve to permit alternate suction and escape of air from the syringe, and an ordinary 50 cc. syringe to provide the suction. The right hand first holds the end of the catheter, which is quickly inserted into the patient's mouth toward the uvula, until the child gags or coughs. The right hand then changes position, grasping the handle of the piston, and suction is commenced with the tip of the catheter as close to the larynx as possible. This strong suction in the back of the throat serves to aspirate sputum from the larynx and also to irritate the cough

reflex, thus making the cough more explosive. When the sputum is seen to rise into the glass tubing, the catheter is removed from the mouth and placed in a sterile culture tube. The sputum is then forcibly driven out of the catheter by the syringe. The nasopharyngeal method employs a slightly different equipment. The stiff rubber throat catheter is replaced by a seven-inch rubber tube, the diameter of which depends on the child's nares. The nasal catheter is passed through the naris until it is judged to have reached the adenoid area. Suction is then begun and is continued while the catheter is slowly withdrawn from the nose. This method has been found invaluable in the diagnosis of obscure febrile conditions, particularly in the differential diagnosis between pneumonia and acute appendicitis. Where no pneumococci are found on the direct smear, the child is not likely to be suffering from early pneumonia.

Gordon and Keleman[31] believe that palatopharyngeal myoclonus, found in arteriosclerotic patients, may be a manifestation of vascular changes similar to that of other neurological syndromes found in these patients. It has been attributed to a rhombencephalic lesion, especially to an involvement of the olivodentate complex. The etiology of the syndrome varies according to the organic process present.

Proetz[32] points out that the typical American cigarette is treated with some hygroscopic agent which causes it to hold the desired amount of moisture. The combustion products which constitute smoke depend upon: *1.* the position of the cigarette while burning; *2.* speed of the puff; *3.* volume of the puff; *4.* frequency of the puffs; *5.* number of the puffs; and *6.* humidity of the tobacco and the room. Experiments by him indicate that the volume of the average puff is between 25 to 40 cc. The total volume of respiration involved is usually around 500 cc. It was decided that the smoke mixture to be investigated should be that of a mouthful of smoke, diluted with a lungful of air. With these standards, rabbits were placed in the smoke machine and made to smoke 10,020 cigarettes in the course of a day. At the end of the day the rabbits were killed, their heads split in the midline and the nasal mucosa inspected for deposits of tar. The tar deposits were confined to the regions of the upper turbinates and the septum opposite these areas. Just what objective changes

were produced in the mucosa by protracted action of cigarette smoke has not been determined. It is not at all certain that they may be classified in terms of color, or even that progressive irritation results in progressively heightened color. The author states that he has simply been making tools for future experiments.

Veras[33] reports his observations in four cases in which digital crushing in cases of acute adenoiditis was performed. He discusses these cases and warns of the difficulty of diagnosing prolonged adenoid inflammation.

Melchionna[34] and Moore reflect on the development of the anterior lobe of the pituitary gland. It is derived from the epithelial evagination of the roof of the posterior nasopharynx, known as Rathke's pouch. This mass of epithelial cells loses its attachment to the pharynx, migrates through the tissue which later becomes the sphenoid bone, and comes to rest in the anlage of the sella turcica. According to Haberfeld and Christeller there always remains a small piece of typical or atypical pituitary tissue in the pharyngeal mucosa, which is designated as the pharyngeal pituitary gland. Material from 52 unselected autopsies was used. In 51 of the 54 cases examined, a small mass of atypical pituitary tissue was found in the pharyngeal mucosa. The differentiated cells of the gland were found to be histologically identical with those of the anterior pituitary gland but there were distinct quantitative differences. There was a distinct deficiency of basophilic and acidophilic cells. The relative deficiency of the chromophilic cells and the small size of the gland renders it unlikely that the pharyngeal body contributes any significant pituitary function. The gland was most commonly located in the midline, deep in the mucosa, or in the periosteum beneath or near the vomerosphenoidal articulation. The general shape was a flattened spheroid. The lack of significant changes in the pharyngeal pituitary gland in five pregnant females reported by Hatfield shows that the cells do not respond to the altered hormone conditions of pregnancy.

TUMORS – BENIGN.

Osteoma: Hita and Ogita,[35] in reviewing the literature, found that osteoma of the base of the tongue is exceedingly

rare. They report a case occurring in a man, age 23 years, His chief complaint was dysphagia of four months' duration. The tumor was located slightly to the right, on the base of the tongue, and was quite smooth on palpation. It was removed under local anesthesia and measured 6 x 5 mm. No theory was advanced to account for the presence of an osteoma in such a location.

Mixed Tumor of the Salivary Gland Type: Mixed tumors of the salivary gland type, according to Fox,[36] are benign tumors entirely separated from the salivary glands and probably originating from embryonic cells (ectoderm and mesoderm), which have become detached from the body of the gland. They are firm, slightly nodular, completely encapsulated, do not break down, and cause little local reaction and discomfort. They are usually found in the tonsillar and palatine area, where they develop gradually until they occupy a large portion of the pharyngeal space. They are easily diagnosed from their appearance and behavior so that biopsy is unnecessary; furthermore, the microscopic structures are varied and complex. Inspection reveals externally a fullness or swelling of the neck below the lower jaw and the mastoid process, over the adjacent surface of the mandible and over the parotid region anterior to the ear. There is no inflammation of the skin and it is not adherent to the tumor. The pharynx shows a smooth medial bulging of the lateral pharyngeal wall, producing the impresion that the tonsil has become enlarged. The soft palate is invaded and bulges downward and medially so that soon there is no distinction between the pharyngeal wall and the soft palate. The nasopharyngoscope is satisfactory in observing the increasing medial bulge of the lateral wall of the nasopharynx and the upward prominence of the soft palate. Digital palpation in the early stages shows the prominence of the tonsillar tissue, which seems to rest against a firm base without being a part of it. Later the tonsil is pushed backward and downward so that it is not easily palpated. One finger in the pharynx and the other hand on the neck discloses a tumor which can be moved in small excursions from side to side. Irradiation has no beneficial effect and it complicates surgical removal by the resulting scar-tissue formation. The most satisfactory treatment is complete surgical removal of the growth, with its capsule intact,

through an intrapharyngeal incision. This procedure leaves no more distortion than many tonsillectomies, and no alteration of pharyngeal function. It avoids a large incision in the skin and the danger of working through important neck structures. Ligation of the external carotid facilitates the operation by reducing the amount of hemorrhage.

Malignant Tumors: While malignancies of the nasopharynx comprise but a small part of the otolaryngologist's practice, Weinberger[37] feels that these cases often prove distressing because of delay in diagnosis and problems in treatment. He feels that the question of nomenclature has now been clarified by the work of New, Borders and Childrey. They reduce the sometimes sophistic differentiation of all such neoplasms to two groups: squamous-cell epithelioma of high grade malignancy and lymphosarcoma. Weinberger quotes Salinger and Perlman in connection with the much discussed lymphoepithelioma to the effect that it might well be included in the transitional-cell type of carcinoma, and concludes that, aside from Broder's classification, most of the terminology has been in error. Nasopharyngeal malignancy may occur at any age but it is most common between the ages of 40 and 60 years. Characteristically, the focus of the tumor is often small, but it has a tendency to spread widely and deeply beneath the mucous membrane, so that severe intracranial symptoms occur early, while ulceration, hemorrhage and nasal obstruction are late manifestations. Lymphosarcomas differ in an early enlargement of the primary tumor with a consequent early nasal obstruction. Grimberg and Arbuse[38] report a case of a pharyngeal tumor producing symptoms of aneurysm of the internal carotid artery in consequence of extension of the growth to the base of the brain. The symptoms were pain in the face and parietotemporal region, and diplopia. Later there developed blurring of the vision and ocular palsies, with diminution of the corneal reflex. As the Roentgenographic studies suggested the presence of aneurysm of the internal carotid, and pressure over the vessel relieved the pain in the face, the diagnosis of aneurysm was made and the carotid ligated. The relief was not sustained, however, and the original symptoms, together with evidence of further intracranial involvement supervened, following which the patient soon died. The histological diagnosis was of interest because of

the uncertainty of the character of the structure of the tumor, and after several eminent pathologists and neurosurgeons had ventured their opinions, there was a sufficient deposition in favor of adenocarcinoma arising from the glands of the nasopharynx. Regardless of the accuracy of the histological diagnosis, it was clear that the tumor must have arisen from the nasopharynx and, by eroding through the left wing of the sphenoid, entered the cranial cavity. Brunner[39] reports a case illustrating the occurrence of a typical carcinoma by contact. It consisted of a primary epipharyngeal carcinoma, which, aside from destroying the base of the skull and infiltrating much of the hypopharyngeal and lingual structures, had seeded itself into the nasal surface of the soft palate. He has no other explanation for the occurrence of the tumor in the latter location exception by contact of the soft palate with the original focus. Custodis[40] draws attention to the location of tumors of the nasopharynx with regard to the base of the skull and the sphenoid. From the experience of the four cases which he presents he feels that benign and malignant tumors in this region may produce disturbances of the sensory, motor and sympathetic nerves of the eye. He advises an examination of the nasopharynx in unexplained conditions involving the eye and the nerves about the orbit. Hauser and Brownell,[41] in a report of 150 cases of carcinoma of the pharynx, listed cervical enlargement as a prominent early manifestation of the disease. Among other symptoms mentioned above, they also include headache and sore throat among the important complaints. Ormerod[42] says that, excepting the tonsillar region, tumors of the oropharynx are rare. The only growth of importance is the squamous-cell carcinoma of the posterior pharynx, which occurs chiefly in elderly women. It is characterized by a midline mass situated on the posterior wall and it is easily visible on depressing the tongue. It is hypertrophic in type and causes a swelling which is either granular or cauliflower in appearance. Ulceration is not common. By extension it may spread upward to the nasopharynx or downward to the hypopharyngeal region. The symptoms are chiefly those caused by interference with deglutition. There may be some pain but it is slight in proportion to the size of the mass. In younger males, similar tumors may be found on the lateral pharyngeal wall, below the lower pole of the tonsil. These are likewise squamous-cell carcinomas as

a rule, but they tend to ulcerate earlier and to extend downward, when they become typical tumors of the sinus pyriformis. The symptoms in this situation are chiefly dysphagia and odynphagia but they are not early manifestations. The vallecula is sometimes invaded by a malignant growth, which is often of the basal-cell variety. The early symptoms of such a growth are difficulty in swallowing and a sensation of a lump in the throat. Fungation and ulceration are early developments and on inspection the ulcerating mass may be seen filling the space of the vallecula and distorting or displacing the epiglottis. In all of the above growths, there is a tendency to secondary infection with its attendant fetor and purulent saliva.

LYMPHOEPITHELIOMA.

Capps[43] is among those who stoutly maintain that lymphoepithelioma should be regarded as a separate clinical entity. Of 36 cases of malignant tumors of the nose and nasopharynx which he carefully observed between the years 1926-1936, he is satisfied that the proper diagnosis was carcinoma in 24; but 12, he thought, merited the diagnosis of lymphoepithelioma, either for clinical or histological reasons. Six of the cases were of nasopharyngeal origin, and to these he adds two more, discovered subsequent to 1936. The symptoms in order of appearance are: *1.* deafness; *2.* defective mobility, and later, distortion of the palate on the same side; *3.* involvement of the Vth nerve, with pain in the ear, side of the head, jaws and tongue; and *4.* trismus, a late finding. The author found that the period between the onset of the symptoms and discovery of the primary growth varied from three to six months in six cases. In two cases, after a careful search in the nasopharynx for a primary tumor, with negative results, a repeat examination two weeks later showed the primary growth in both cases. He believes it is of utmost importance, when a patient has the above-mentioned symptoms or neuralgia involving the lower divisions of the trigeminal nerve, to do repeated posterior rhinoscopic examinations until either the symptoms disappear or a satisfactory explanation is found for them. The appearance of the primary tumor is well described in Gardham's paper: "It is small and sessile, lying in the lateral wall of the pharynx in the region of the

Eustachian tube. It is pink in color, firm to the touch, and ulceration is slight or absent in the early stages." The treatment of choice is irradiation because of the inaccessibility of the tumor and because of its extreme radiosensitivity. The author feels that teleradiation should be used first. He has no experience with the radium bomb. The total dosage must depend to some extent on the toleration of the patient and the amount of reaction which results. If teleradiation fails to eradicate the tumor completely, the question of supplementing the dose with interstitial radium or radon seeds arises. It is rare for the metastases not to disappear completely, but the primary growth does not always do so. The prognosis according to the most recently reported series appears to be bad.

COMPLICATIONS PRODUCED BY MALIGNANT TUMORS OF THE NASOPHARYNX.

Martin[44] states that in one-third of the cases of carcinoma of the pharynx, the sphenoid bone is involved. The thin structure forming the floor of the middle fossa on either side of the sella turcica is completely destroyed or becomes moth-eaten in appearance, and malignant tissue invades in and around the sella, often displacing but never invading the pituitary gland. Examples of involvement of all the cranial nerves have been reported but the author doubts if a true VIIIth nerve palsy has ever been seen from the extension, due to the fact that this nerve passes from the brain into the petrous portion of the temporad bone and does not enter the neck. Since the VIth nerve is the lowest of the nerves that pass through the sphenoid fissure, and since the Gasserian ganglion and the branches of the Vth nerve lie directly over the bony structures that are first invaded, their high incidence of involvement is not surprising. A patient with intracranial involvement usually complains of double vision, resulting from interference with the innervation of the muscles of the eye and pain or anesthesia of the face, nose or teeth. Enlarged lymph nodes, first appearing high in the neck behind the angle of the jaw and later in the submental group, may be the first symptom the patient has. Metastatic nodes are more frequent with carcinoma than with lymphosarcoma. From the proximity of the IXth, Xth, XIth and

XIIth cranial nerves to the side of the pharynx, it is evident that either enlarged nodes or direct extension of tumor tissue might produce pressure inaugurating a symptom complex known as the jugular foramen syndrome, characterized by nasal regurgitation of fluids, dysphagia and hoarseness. Before the advent of efficient radiation therapy, people usually died of the primary tumor or extension to neighboring structures, but in the last few years the author has noted that frequently metastatic lesions have appeared in the mediastinum and lung after the disappearance of the lesions of the throat and neck under therapy. Distant metastases have been found in the kidney, stomach, spine and mesenteric structures. Two cases of pulmonary osteoarthropathy in connection with malignancy of the pharynx have come to the author's attention. Treatment of the primary lesions have brought good results but the author believes that more adequate treatment at the base of the skull is necessary and that, while pulmonary metastases respond well to therapy, they are seldom found until after the stomach and kidneys have been invaded.

TREATMENT OF CARCINOMA OF THE PHARYNX.

Ormerod[42] remarks that treatment of pharyngeal cancer was extremely difficult in the preradiotherapeutic period. Removal of a growth on the pharyngeal wall is not only a trying procedure but it is unlikely to be successful because of the extension into neighboring structures and because of the glandular involvement that is frequently present. Diathermy removal made the procedure easier and more successful but it did not eradicate the secondary deposits. Treatment by deep X-rays and distant radium therapy have opened a new field. X-ray or radium or a combiantion of the two may be employed, and the growths are so situated that large doses may be administered by multiple portals without much damage to the skin or other structures. The results have been satisfactory for growths of the posterior pharyngeal wall. The tumor disappears, leaving only a small scar, and as secondary deposits are rare in these cases, expectation of cure is relatively high. Carcinoma of the lateral wall also responds well to irradiation but metastatic recurrence is frequent. Basal-cell carcinoma of the vallecula is difficult to treat. Com-

plete surgical removal is difficult; but direct implantation of radium needles through a suprahyoid incision, followed by distant radiation, has proven somewhat successful. Scott and Moore[45] are not convinced that the improved technique for pharyngotomies with lowered operative risks as devised by Trotter and New and Figi have produced a satisfactory proportion of three- or five-year survivals. They are of the opinion that a better chance of cure and more successful rehabilitation are possible by the use of the principles and technique of Coutard. Of 17 cases of carcinoma of the pharynx reported by Lierle,[46] only one, or 5.8 per cent, of the patients was living after seven years. In this group all lesions were very extensive and inoperable. There was metastasis in 14 cases, an incidence of 82 per cent. In most instances one type of treatment was as satisfactory as another, but the best results appeared to have been obtained by a combination of irradiation and surgical removal.

Hauser and Brownwell[41] found treatment unsatisfactory in their series of 50 cases of cancer of the pharynx. They believe the high mortality can be explained on the basis of late diagnosis after metastasis has taken place. Surgery in their cases did not seem indicated and irradiation was employed.

CANCER OF TONSIL.

Mattick[47] acknowledges that epithelioma of the tonsil is not common. Of 166 cases reported by him, it was present in a ratio of 1:91 of all cancer. Over 80 per cent of the cases occur in males. Histologically, they are generally epidermoid, less often anaplastic, and rarely adenocystic in type. The epidermoid types usually present an ulcerated, indurated tumor mass, which in time will metastasize to the regional nodes. This type is considered radioresistant. The more anaplastic type shows no tendency to ulceration or induration but metastasizes early not only to the regional nodes but to distant organs. This early metastasis is so prominent that often cervical node enlargement may be the first symptom of the disease. The anaplastic type is markedly radiosensitive. Subjectively, the early symptoms are not the cause of much concern to the patient. Slight discomfort or fulness is present in the throat. Pain in the ear on the involved side is common, as is limita-

tion of motion of the temporomandibular articulation, but, unfortunately, these are late manifestations.

Formerly radical resection of the primary focus, with or without block dissection, was resorted to; but the results were very discouraging. At present most tumor clinics treat the lesion by simple biopsy, followed by irradiation, using either interstitial radon implants, intraoral X-ray or both, preceded or followed by external high voltage X-ray or teleradium pack. Block dissection of the glands is advocated chiefly when the primary lesion is healed, and the growth is still confined within the capsule of the node. The results in the 166 cases as a whole were poor, but in the group treated between 1932 to 1935, as a consequence of a more perfected technique, they are more encouraging.

While concurring with Mattick in recommending irradiation as the general method of choice in carcinoma of the tonsil, Ormerod[42] states that in Norman Patterson's hands removal of the growth by means of the diathermy knife has been carried out with great success. He feels that when the tumor is restricted to the tonsil, diathermy removal followed by irradiation of the neck is the best plan of procedure.

TREATMENT OF METASTATIC CERVICAL LYMPH NODES.

Martin[48] states that the use of irradiation as the method of choice in the treatment of primary malignancies of the lip, mouth and throat is rapidly gaining in favor. The improved cosmetic results, lowered mortality and economic saving to the patient tend to relegate the more radical surgical procedures to a secondary position. He challenges the oft-repeated statement that the chance of cure by methods of irradiation become negligible after the primary lesion reaches a diameter of more than 1 cm. With regard to metastatic cervical nodes, he feels that since the advent of the Coutard method, it is advisable to divide them into two large groups: *1.* those produced by lesions of the pharynx, posterior third of the tongue and tonsillar area; and *2.* those produced by lesions of the face, lip, tongue, floor of the mouth, cheek and palate. The success of irradiation in eradicating the glands secondary to most throat lesions has completely removed this group from the field of surgery. In this group, which consists of 12 cases,

although many of the patients died, glandular metastasis did not recur after one Roentgen series had been administered. The second group was not so fortunate.

The practice of the past 30 years of radical block dissection of the neck is criticized. Many have felt that the removal of uninvolved tissue containing natural defense barriers is unwarranted because the operative mortality in such procedures is almost as high as the per cent incidence of metastasis to such tissue after irradiation of the primary lesion. Because the pattern as shown by Roentgenograms has not had an even spacing in the case of radon implantations long, weak platinum radium needles have been employed. They are inserted through small skin incisions and placed parallel to one another, about 1 to 1.5 cm. apart. They are usually kept in place for about seven days. This is sufficient in many instances, but when more radiation is necessary, Roentgen treatment is supplemented, care being used in their application to the needled areas. The combined therapy causes a marked reaction, but healing is usually prompt, and the healed skin compares favorably with that subjected to heavy Coutard treatment.

In the discussion of this article, several exceptions to the plan of procedure are taken by Douglas Quick. He is wholly opposed to the use of needles or seeds through skin punctures, on the ground that the neck has too many vital structures which, in this manner, may be injured with serious consequences.

Cade[49] is among those who are still of the opinion that cervical nodes should be dealt with by radical excision. In his article on cancer of the tongue, he states that the cervical nodes which occur in 80 per cent of the cases should be thus removed when, *1.* the primary growth has been adequately dealt with; *2.* when the nodes are palpable but not fixed to the surrounding tissues; and *3.* when the patient is a good risk for a major surgical operation.

BIBLIOGRAPHY.

1. Baker, M. J.: Waldeyer's Ring. *Ky. Med. Jour.*, 37:152-156, April, 1939.

2. McCarrell, J. D.: Lymphatic Absorption. *Amer. Jour. Physiol.*, 126:20-7, May, 1939.

3. Levine, H. D.; Hoerr, S. O., and Allanson, J. C.: Vesicular Pharyngitis and Stomatitis; Unusual Epidemic of Possible Herpetic Origin. *Jour. A. M. A.*, 112:2020-2022, May 20, 1939.

4. Long, A. P.; McKhann, C. F., and Cheney, L. L.: Hospital Infections; Nasopharyngeal Flora and Disease of Respiratory Tract in Infants. *Amer. Jour. Dis., Child.*, 57:363-372, June, 1939.

5. Scholes, F. V.: Streptococcal Pharyngitis and Its Complications. *Med. Jour. Australia*, 2:1065-1077, Dec. 24, 1938.

6. Hoople, G. D.: Nonsurgical Treatment. *Ann. Otol., Rhinol. and Laryngol.*, 48:73-80, March, 1939.

7. Sheplar, A. E.; Spence, M. I., and McNeal, W. J.: Serum Therapy for Streptococcic Infections of Nose, Throat and Ear, and Its Complications. *Arch. Surg.*, 38:206-223, Feb., 1939.

8. Meyer, A.: Indications, technic and resultats de la radiotherapie des etats inflammatoires des amygdales et du rhinopharynx. *Bull. et. men de'electroradiol., Med de France*, 26:48-52, Jan., 1938.

9. Fenton, Ralph A.: Sulfanilamide in Otology — Personal Experiences. *Ann., Otol., Rhinol. and Laryngol.*, 48:7-22, March, 1939.

10. Grodinsky, M.: Retropharyngeal and Lateral Pharyngeal Abscesses; Anatomic and Clinical Study. *Ann. Surg.*, 110:177-199, Aug., 1939.

11. Rimer, F. H.: Diagnosis and Treatment of Retropharyngeal Abscess. *Pa. Med. Jour.*, 42:1197-1198, July, 1939.

12. Waldapfel, Richard: Abscess of the Parapharyngeal Lymph Glands Following Infections of the Throat. *Pract. Oto-Rhino-Laryngol.*, 2:69, April, 1939.

13. Gilmore, G. B.: Internal Jugular Vein Thrombosis Secondary to Lateral Pharyngeal Abscess; Case. The Laryngoscope, 49:106-110, Feb., 1939.

14. Etter, L. E.: Cervical Abscess Resulting from Unusual Foreign Body in Pharynx. *Arch. Otolaryngol.*, 30:631-632, Oct., 1939.

15. Fort, A. G., and Brown, L. A.: Ulceration of Nasopharynx Resulting from Pressure Necrosis (Due to Tubercle of Atlas). *Arch. Otolaryngol.* 29:553-556, March, 1939.

16. Sekine, Masso, and Yokoo, Masso: Rhinopharyngitis Mutilans on the Island of Palau. *Oto-Rhino-Laryngol.*, 12:3, Jan., 1939.

17. Fox, N. S., and Wiggleswortн, A. M.: Cod Liver Oil in Local Treatment of Pharyngitis. *M. Bull. Vet. Admin.*, 16:149-151, Oct., 1939.

18. MacCallum, F. O., and Findlay, G. M.: Lymphocytic Choriomeningitis; Isolation of Virus from Nasopharynx. *Lancet*, 1:1370-1375, June 17, 1939.

19. Shannon, E. H., and Veitch, A. H.: Diseases of Hypopharyngeal Region Producing Dysphagia; Roentgenoolgic Consideration. *Amer. Jour. Roentgenol.*, 42:173-185, Aug., 1939.

20. O'Bannon, R. P.: X-ray Examination of Larynx and Pharynx. *Tex. State Med. Jour.*, 34:849-851, April, 1939.

21. Pfahler, G. E.: Roentgen Diagnosis and Treatment. *Radiol.*, 33:42-53, July, 1939.

22. Muslow, J. E.: X-ray Study of Hypopharynx, Larynx and Trachea; Use in Laryngeal Diagnosis. *Arch. Otolaryngol.*, 29:326-333, Feb., 1939.

23. Morganstern, David J.: Congenital Atresia of Postnasal Orifices. *Arch. Otolaryngol.*, 31:653-662, April, 1940.

24. Goodyear, H. M.: Choanal Atresia; Description of Operation. *Arch. Otolaryngol.*, 29:974-976, June, 1939.

25. Watt, J. L.: Pulsion Diverticulum, with Report of Case. *Med. Jour. Australia*, 2:905-907, Nov. 26, 1938.

26. Harrington, S. W.: Pulsion Diverticula of Hypopharynx; Review of 41 Cases in Which Operation Was Performed, and Report of Two Cases. *Surg. Gynec. and Obstet.*, 69:364-375, Sept., 1939.

27. Shephard, J. H.: Pharyngoesophageal Diverticula; Modified Technique for One-Stage Operation. *Cal. and West. Med.*, 51:156-159, Sept., 1939.

28. Crowe, S. J.: Prevention of Deafness in Children (by Removal of Lymphoid Tissue Around Eustachian Tubes). The Laryngoscope, 49:591-598, July, 1939.

29. Baylor, J. W., and Crowe, S. J.: Prevention of Deafness (Role of Pharyngeal Lymphoid Tissue Blocking Eustachian Tube). *Jour. A. M. A.*, 112:585-590, Feb. 18, 1939.

30. Auger, W. J.: Original Method of Obtaining Sputum from Infants and Children, with Reference to Incidence of Pneumococci. *Jour. Pediat.*, 15:640-645, Nov., 1939.

31. Gordon, G. J., and Keleman, E.: Clinical Contribution to Study of Myoclonus (Case). *Del. State Med. Jour.*, 11:107-108, May, 1939.

32. Proetz, A.: Preliminary Experiments in Study of Cigarette Smoke and Its Effect Upon Respiratory Tract. *Ann. Otol., Rhinol. and Laryngol.*, 48:176-194, March, 1939.

33. Veras, S.: Pharyngeal Touch in Therapy of Prolonged Acute Adenoiditis; Difficulties of Diagnosis of This Disease. *Arch. de med. d. enf.*, 42:217-224, April, 1939.

34. Melchionna, R. H., and Moore, R. A.: Pharyngeal Pituitary Gland. *Amer. Jour. Path.*, 14:765-772, Nov., 1938.

35. Hita, Tetsusabaro, and Ogita, Ken: Osteoma at the Base of the Tongue. *Oto-Rhino-Laryngol.*, 11:1016, Nov., 1938.

36. Fox, C. C.: Mixed Tumors of Salivary Gland Type. *Arch. Otolaryngol.*, 30:73-85, July, 1939.

37. Weinberger, N. S.: Malignant Tumors of Nasopharynx and Paranasal Sinuses. *Ann. Otol., Rhinol. and Laryngol.*, 48:203-211, March, 1939.

38. Grimberg, L. E., and Arbuse, D.: Tumor of Base of Brain Simulating Aneurysm of Internal Carotid Artery. *Jour. Ner. and Ment. Dis.*, 90:22-30, July, 1939.

39. Brunner, H.: Carcinoma of Epipharynx; Peculiar Case. *Arch. Otolaryngol.*, 29:544-549, March, 1939.

40. Custodis, E.: Ocular Symptoms in Epipharyngeal Tumors, Reported Case. *Klin. Monatsbt. for Augenh.*, 101:49, July, 1938.

41. Hauser, I. J., and Brownwell, D. H.: Malignant Neoplasms of Nasopharynx. *Trans. Sect. Larnygol., Otol. and Rhinol., A. M. A.*, pp. 278-296, 1938.

42. Ormerod, F. S.: Cancer of Throat. *Prac.*, 143:49-62, July, 1939.

43. CAPPS, F. C. W.: Lymphoepithelioma. *Jour. Laryngol. and Otol.*, 54:135-140, March, 1939.

44. MARTIN, C. L.: Complications Produced by Malignant Tumors of Nasopharynx. *Amer. Jour. Roentgenol.*, 41:377-390, March, 1939.

45. SCOTT, W. G., and MOORE, S.: Roentgen Treatment of Carcinoma of Hypopharynx. *South. Med. Jour.*, 32:144-150, Feb., 1939.

46. LIERLE, D. M.: Epidermoid Carcinoma of Pharynx, Buccal Mucosa and Larynx. *Jour. Ia., Med. Soc.*, 29:116-118, March, 1939.

47. MATTICK, W. L.: Epithelioma of Tonsil. *N. Y. State Jour. Med.*, 39:1412-1419, July, 1939.

48. MARTIN, C. L.: Treatment of Metastatic Cervical Node. *Amer. Jour. Roentgenol.*, 41:819-833, May, 1939.

49. CADE, STANFORD: Cancer of the Tongue. *Prac.*, 143:40-48, July, 1939.

921 Canal Street.

PANEL DISCUSSION.

INFORMATION PLEASE: REGARDING HEARING AIDS AND AUDIOMETERS.

DR. FREDERICK T. HILL, *Chairman*, Waterville, Me.

CHAIRMAN HILL: Apparently there are two subjects, somewhat diverse, that interest the clinical otologist, and it has been felt that these might be discussed by a panel, even considering that the subjects are somewhat unrelated.

The panel is going to adopt the plan of the popular radio program, "Information Please," and we have accumulated questions from the audience which will be used. We will try to keep them in some sort of order.

This panel is supposed to represent a cross-section of the Society, not all experts, not all otologists, as it includes Mr. Carter, of the Council on Physical Therapy of the American Medical Association.

If any additional questions come to your minds we will appreciate your sending them up to us in writing. It will avoid confusion, and we will try to keep the program within some sort of limits.

Perhaps the first question which might well be brought to the consideration of this panel is one that I will address to Mr. Carter:

"When did the Council first consider hearing aids and audiometers?"

MR. CARTER: The first audiometer was submitted to the Council in 1934. The first audiometer was accepted in 1940; however, it was not the same audiometer. The first hearing aid was accepted in 1935. I believe that answers your question.

CHAIRMAN HILL: The second question might well go to you:

"How was the Committee on Audiometers appointed, who composed it, and when can a report be expected?"

MR. CARTER: The Council on Physical Therapy appointed a group of consultants in 1936. This came about as follows: It was observed by Dr. Hayden, who was Secretary of the Board of Trustees of the American Medical Association, that the Council would probably be able to do better work on audiometers and hearing aids if it had a group of consultants; hence this matter was taken up with the Board and the Board appointed a group of consultants. These consultants are not paid. The members of the Council on Physical Therapy serve without remuneration; the consultants serve without remuneration, too, and they have done an enormous amount of work. I am off the subject right now, but I might say that 33 communications have been sent out and at least that much advertising. The consultants have gone through the advertising and have made comments and criticisms. A report is now in progress. Here it is, in rough draft. It has to be adopted by the consultants, and when it is adopted, it will be published in the *Journal of the American Medical Association*.[1] The following men served as consultants: Drs. Bunch, Coates, Fowler, Hayden, Jones, Macfarlan, Newhart, Shurly, Wherry, Nash, Paul Sabin, who is at the Riverbank Laboratories, and Beasley.

DR. HILL: "How does the Council go about considering an audiometer, Mr. Carter?

MR. CARTER: An audiometer is submitted to the Council and is given consideration as follows: When the firms first make application for consideration, we send them a book of rules. These are the official rules of the Council on Physical Therapy. In these rules are found regulations concerning advertising, names of the equipment, and so forth. They apply not only to audiometers but also to physical therapy apparatus. At the same time we also send the minimum requirements for acceptable audiometers.

DR. MOSHER: Is any of the advertising of audiometers or hearing aids at present unethical?

MR. CARTER: Yes, there may be some unacceptable statements in the advertising.

DR. MOSHER: How do you clear it up?

MR. CARTER: It is taken up with the firm. When an advertisement is noted, by one of the consultants, or by any member of the profession, it is sent to the Council. I then turn it over to the consultants and Council members and ask them to comment, and as soon as I get their comments I take the matter up with the firm. Ordinarily we get co-operation on the part of the firm, and an agreement to withdraw the advertising from circulation.

CHAIRMAN HILL: I am pushing you a little hard, Mr. Carter. Right now there is another question:

"Has the Council adopted requirements for acceptable hearing aids?"

MR. CARTER: Yes, tentatively, "Minimum Requirements for Acceptable Electric Hearing Aids." I have them for the audiometers and for hearing aids, and I have the revised one for hearing aids.[2]

CHAIRMAN HILL: "Has the Council on Physical Therapy accepted any audiometers?"

MR. CARTER: Yes, three have been accepted. On two of them the reports have been published in 1940.[3]

Now, about a year ago — probably a little more — the Jones-Knudsen Audiometer was accepted by the Council, but the report was not published because the firm informed the Council that the unit would be withdrawn from the market because of the production costs which, they felt, were so high it probably would not sell.

CHAIRMAN HILL: What are the names of these?

MR. CARTER: The two that have been accepted are the Maico G5 and the Western Electric 6B.

CHAIRMAN HILL: "What are some of the chief technical obstacles which have delayed the acceptance of audiometers for clinical use?"

MR. CARTER: Minimum requirements for acceptable audiometers, of course, took some little time to prepare. I desire to give credit at this time to the Sub-Committee on Audiometry and Hearing Aids, of the Sectional Committee of Acoustical Measurements and Terminology, of the American

Standards Association, for assisting with these minimum requirements. Considerable correspondence took place before these were adopted.

After the requirements were adopted, it took some time to get manufacturers to meet them, and the reason for that was that the manufacturers in some instances had difficulty in meeting the requirements which they themselves regarded as being just and reasonable. Eventually we found that the two audiometers met the requirements of the Council.

DR. GOLDSTEIN (from the floor): Could we have those minimum requirements read?

MR. CARTER: I will have them passed around.[4]

CHAIRMAN HILL: Dr. Proetz, "What should be the first desideratum in an audiometer, in your opinion?"

DR. PROETZ: Accuracy of pitch, accuracy of volume, purity of tone.

CHAIRMAN HILL: "What is the best type of audiometer, in your opinion, for clinical use?"

DR. PROETZ: For clinical use I would say the simplest is one within the half-octave pitches rather than the sweep range. I think for scientific investigation the sweep range is probably the best, but as far as any actual clinical requirements and expeditious use are concerned, the half-octave pitches in logarithmic progression are the best.

DR. FOWLER: I want to ask Dr. Proetz why he thinks the half-pitches are necessary. Why not the octave? Isn't that sufficient for clinical use?

DR. PROETZ: Only for this reason. In the case of progressive deafness of any kind, you will be much more likely to detect it early if you have your intervals not too long.

CHAIRMAN HILL: Do you feel there is any advantage in the continuous pitch range audiometer for clinical purposes?

DR. PROETZ: I cannot think of any, and I think one of the disadvantages would be inaccuracy of observation in the hands of people not highly trained.

DR. FOWLER: Also, it is harder to calibrate.

DR. PROETZ: That is correct.

CHAIRMAN HILL: Here is a question, Dr. Bunch: "How necessary is masking?"

DR. BUNCH: In my own work I have always considered that masking is absolutely necessary and should be ready for use on any case that comes for hearing tests. We use masking in all of our audiometer tests of bone conduction, and in tests of air conduction where the difference in the two ears is 40 units or more. The equipment for masking is always ready and is used continually.

DR. FOWLER: How much masking do you use?

DR. MOSHER: What is the simplest and best form of masking?

DR. BUNCH: As to that question, I refer the Society to the report that was published by the Committee on Bone Conduction, I think in the *Proceedings* of this Society for 1936. Several types of masking were given in that report.

CHAIRMAN HILL: Dr. Mosher wishes to know what form you use.

DR. BUNCH: The buzzer used ordinarily consists of a telephone receiver connected through a toy transformer to the alternating circuit of the room. This gives a masking sound of approximately 85 dcb. The transformer has fixed steps so that the intensity can be stepped down if we wish.

DR. FOWLER: The question I asked was: How much masking do you use, with the intent of bringing out the point which is of interest to all of us, and that is: If you don't control the masking, you don't know how much you are masking the ear you are testing; therefore, I should like to know how much masking you use and how you measure the amount of masking you use.

DR. BUNCH: I attempted to answer that by saying that the masking used is approximately 85 dcb. In cases that require greater masking, we use the Bárány Buzzer. We have tested repeatedly with two loud Bárány Buzzers tightly in the ears, and patients with good hearing have not been able to hear the loudest shouted voice.

CHAIRMAN HILL: What do you use, Dr. Fowler?

DR. FOWLER: I believe in using the faintest tone that will accomplish the masking. That is the best you can do. If you use 85 dcb. masking, you are going to throw over into the other ear 40 or 50 dcb. of masking, because if you get over 40 or 50 dcb. through the receiver you are bound to get it on the other side.

The method I have used for many years until recently has been the air noise produced by connecting a double stethoscope to an air pressure tank, and then opening the throttle just enough to mask the ear in question. First, put it in both ears and with a tuning fork or B.C. receiver on the vertex or the mastoid be sure its frequency is masked. Then take the stethoscope earpiece out of the ear to be tested and proceed with your testing, retaining the masking sound in the other ear. If you do this you will have the least possible intensity that will mask the testing ear. I think the ideal type of masking is a thermal noise because it masks equally all frequencies.

CHAIRMAN HILL: Dr. Proetz, "of how much value are determinations of bone conduction throughout the entire range?"

DR. PROETZ: I am entirely confused in the matter of bone conduction. I don't know quite what it means to me. In my own work I take it only in the middle range unless there is some particular reason for extending it.

CHAIRMAN HILL: Dr. Bunch, do you wish to amplify that?

DR. BUNCH: Only that I test bone conduction only at 512 and then chiefly to give me a check on the Weber-Rinne tests. I do this because we have a group of men in our graduate courses, and many younger men, and I feel that their reports of tests with tuning forks should be checked.

CHAIRMAN HILL: There has been a request for a discussion of bone conduction devices. Do you wish to continue and say something about that?

DR. BUNCH: The bone conduction devices that I have tested were of little or no value for frequencies above 1,024. I use 512 in my own work.

The reason why bone conduction receivers have, in my hands, been worthless for higher tones is because there is so much radiation through air that normal hearing patients are unable to tell whether they are hearing the sound by air conduction or by bone conduction. In the lower tones there is a tendency to confuse tactile impression for hearing. Tuning forks, for the same reasons, give similar results.

DR. FOWLER: Of course, that is a controversial question. I feel very strongly that bone conduction is no more mysterious than air conduction. I feel that all sounds go into the head both by air and by bone conduction, and that the predominance depends on the method of application and the intensity of the sounds. My own bone conduction receiver is the original one made, and it works very satisfactorily up to 4,000. As for the lack of standardization militating against the use of the bone conduction receiver — I think this is a myth. I think if you have a bone conduction receiver, you can at least establish a normal for it and use it for bone conduction measurements. You may think, because you are accustomed to hearing by air, that the air conduction receiver is accurate; you consider it true. But if the bone conduction receiver does something you think it shouldn't do, you consider it inaccurate.

CHAIRMAN HILL: Dr. Proetz, "what do you consider the best form of audiogram, and why?"

DR. PROETZ: To my mind, if an audiogram is to be accepted as a standard, the simplest form, the simple logarithmic curve. What I am after is one with as little modification as possible. If there are to be any modifications for purposes of compensation or research, or any other purpose, they can be superimposed by the individual to meet his own needs. We also must avoid audiograms in which the details are too fine for purposes of reproduction.

Most published papers which include any audiograms include a great many and, for practical purposes, one should be able to put eight audiograms on a page.

It is sometimes very difficult to reproduce these things when the lines are so fine and so close together. I would also urge, for that reason, that these various auxiliary bone con-

duction lines, and so forth, be left off, because in printing an audiogram, naturally it has to be in black and white, and these extra lines are confusing.

DR. MOSHER (interposing): You have one of your own?

DR. PROETZ: Here it is. It is legible and simple, with as little print as possible around the edge.

The question arose whether it would not be better to use 50, 100, 200 or 800, etc. I answered then that it did not make any difference to me, but I think for purposes of comparison it might be easier to keep the old arrangement, 32, 64, 128, etc.

DR. FENTON (from the floor): I believe Dr. Proetz is right about this matter, because most of us still use tuning forks for certain purposes; and I note that most of the audiometers have their frequencies marked in terms of the old tuning forks, so why not continue? If we jump to something else, we shall all be confused again, and we will have to buy something new or have new labels. Why not continue the old arrangement, with which we are all familiar and which we are all using?

CHAIRMAN HILL: Here is a question that just came from the floor. I should like volunteers to answer it:

"Why not re-evaluate, if normal for bone conduction, by blocking the external meatus?"

DR. FOWLER: Every otologist knows that any normal ear blocking will bring up the bone conduction, introduce impedance and change the acoustics of the middle ear. He also knows that in most cases of obstructive deafness, blocking doesn't matter, because the ear is already blocked.

CHAIRMAN HILL: Another question, Dr. Bunch: Is there any agreement as to the value of dropping of the 64 d.v.?

DR. BUNCH: That is one of the questions which caused considerable disagreement. One audiometer which has been accepted goes to a hundred; the other is calibrated to 128, but the tone of 64 is produced but is not so indicated on the dial. There is no general agreement.

Personally, I like the lower tones and have been in trouble several times with the committee of consultants because I desired it included.

DR. FOWLER: I think the chief objection to using the 64 and lower frequencies is that frequently you don't know whether your patient is responding to the hearing of sound or the feeling. The thresholds for the lower tones are very hard to sense accurately; moreover, a great many cases may give you a normal or slightly subnormal hearing for these low tones and, when tested by the loudness balance technique, you find that the threshold obtained is erroneous. The patients have been feeling the sound and misinterpreting this as hearing. You can, in fact, get all the information from your 128 and 256 that you can get from the lower tones, if you will use them accurately, because a diminution of 128 and 256 gives you the information you want.

MR. CARTER: There has been considerable discussion regarding the cost of audiometers and that is another reason why 64 d.v. might well be left out. The equipment required to bring out the pure tone for 64 d.v. increases the cost of production.

DR. PROETZ: Is the impurity of the tone sufficient to warrant its omission? Are the overtones of that original fundamental sufficiently loud to introduce any practical error?

MR. CARTER: If the tone isn't pure, and the patient hard-of-hearing, at 64 d.v. the ear is likely to act as a filter. The patient might hear a different tone (harmonic), rather than the desired test tone.

DR. PROETZ: If it is not out of that low octave, does it make any difference?

MR. CARTER: He might be hearing 164 vibrations per second, or 128, or higher, but not 64.

DR. FOWLER: There is another objection to testing low tones and the extremely high tones, and that is the length of time it takes to make an examination. It is much better to make a careful examination, and a satisfactory one, from 128 or 256, up to 8,000, than to spend twice the time trying to include all the high and low tones. You will get no more

practical information. Young people, and often old people, and very little children especially, get very tired during tone tests and, in my opinion, this will interfere with the accuracy of your test.

DR. GOLDSTEIN (from the floor): To get back to the bone conduction for low frequencies. We do know that with the tuning forks we have such a thing as a conduction defect that cannot be heard by a 64 fork, but can be heard by a 128 fork; therefore, why rule out the 64 d.v., either in the audiometer or any other form of functional test?

DR. FOWLER: Dr. Goldstein is talking about his very deaf children. I have otherwise never seen the responses noted by Dr. Goldstein.

DR. BUNCH: Mr. Chairman, when these standards were set up, the committee decided that the tones should be pure to a certain per cent, as indicated in the requirements of the Council. At that time this question came up for a great deal of comment, and, as far as I know, no one has ever found out just how pure a tone should be for hearing tests.

We set up an arbitrary standard at that time and that standard has remained and apparently has been satisfactory.

CHAIRMAN HILL: Dr. Fowler, "Does an audiometer show how much a patient hears?"

DR. FOWLER: No! The audiometer shows how much he doesn't hear.

CHAIRMAN HILL: "How well standardized are the different makes of audiometers today? A Maico and a Western Electric at the Eye and Ear Infirmary do not agree in measurement of the threshold of hearing, and the Western Electric does not agree in pitch with magnesium tuning forks at the Riverbank Laboratory. A Maico and a Sonotone in two offices in a professional building vary 15 dcb. Although no accurate measurements have been made, I am sure that no such difference in extraneous noises exists in two offices."

MR. CARTER: That is an involved question. The two audiometers, they said, do not agree. I assume they mean that the threshold of hearing is different. Now, if those two audiometers were purchased several years ago, or even a half a year

ago, I would be inclined to say that they do not agree. If, however, they are accepted audiometers and they disagree, I would suggest that the questioner get in touch with the firms and have them adjust the audiometers.

I do not believe that there are any changes being made now in audiometers; however, there may be, but I wouldn't necessarily know.

DR. HAYDEN (from the floor): May I comment on the remarks that Mr. Carter has made? It is a well known fact, and it has been brought out here this morning, that the zero level or the starting point of these audiometers is different, and the figures that you have read are perfectly correct. There is an essential difference between a Maico and a Western Electric, both of which are calibrated for a soundproof room, and a Sonotone, which is calibrated for a quiet room. The Sonotone, if it is used in an office that is not soundproof, will show the patient to have about 15 dcb. less of hearing than the Western Electric or Maico; and if it does, it is reporting exactly in conformity with the Western Electric and the Maico, but at a different starting point.

MR. CARTER: Furthermore, I think this brings up the question of the pegging of the threshold of hearing as to energy value. I believe that this afternoon Dr. Beasley will probably touch upon that subject in his paper. It is something that should be taken care of at the earliest possible moment.

CHAIRMAN HILL: This question has just come from the floor, and it seems quite apropos at this time:

"How often should an audiometer be standardized?"

MR. CARTER: At the last meeting of the consultants on audiometers, that question was brought up. I can't give a definite answer, but it was the opinion of the manufacturers — I think I am stating this correctly — that audiometers should be watched rather carefully, and if there is any reason to believe they are off, they should be sent back to the factory.

DR. FOWLER: There is one way of maintaining a standard calibration for your audiometer, and this should be routine procedure: Before testing any patient, the tester should listen to one or two tones of the audiometer to be sure it is

correct. If it is not registering what he or she thinks, either the hearing of the tester or the audiometer has changed. By testing another previously tested person you can find out which.

DR. MOSHER: How often should an audiometer be serviced by the maker?

MR. CARTER: That question I cannot answer definitely.

How do we know we are really checking the intensity? Maybe one's hearing is becoming bad, and the audiogram will change. I should think that it would be advisable to have the manufacturer look it over at least once a year.

DR. MUELLER: For checking the pitch before each hearing test one can use a fork, but how does Dr. Fowler check intensity?

DR. FOWLER: I thought I made it clear that to check up you test the one who regularly uses the audiometer. We usually test 1,024 to see whether the threshold is the same as it was the last time. If there is any question about accuracy, check also for 4,092 and 256, and if those are found normal, the rest of the audiometer is probably also accurate. It is inadvisable as a routine to go through the whole frequency range. In my opinion, whether the pitch is one or two cycles out of the way or not doesn't make the slightest difference. It is the intensity and purity of the tone which is most important.

CHAIRMAN HILL: Dr. Bunch, "Should the audiometer offer high intensities, especially in the upper pitch range, in order to show a more accurate hearing curve in cases where now the curve may show a total loss of hearing in all the upper tones?"

DR. BUNCH: The Western Electric 6B tests up to 10,000; the Maico goes up to 11,000. It is true that many people who are tested show marked loss of hearing for these high tones. It is probably true that you would get a more accurate curve if you had higher frequencies to test for, and I think Dr. Crowe's report yesterday brought that out rather strikingly. In his work it seems that the higher tones are essential for diagnosis.

If anyone wishes to test higher tones, I would refer them to the paper read last year by Dr. Hill, relative to the use of the monochord. He wrote a very comprehensive article, and it has been discussed by others.

Just how much more information will be derived from tests for high tones can be determined only by a clinical practice. The report of yesterday certainly brings out at least one point in favor of using them.

CHAIRMAN HILL: There is another question you might consider: "Is a soundproof room necessary?"

DR. BUNCH: It seems to me that if one is going to find out the very early slight losses of hearing, he can do it only when he works under conditions where the extraneous noises will not interfere with the tests.

DR. MOSHER: Is there such a thing as a soundproof room?

DR. BUNCH: It is a purely relative term. A "soundproof" room, as I am using the term, is one in which extraneous noises do not interfere with the tests. If you fired a cannon outside the door of a soundproof room, it would no longer be soundproof.

DR. MOSHER: Can you get a soundproof room in the ordinary city?

DR. BUNCH: For all practical purposes it can be done.

CHAIRMAN HILL: How about portable booths?

DR. BUNCH: Dr. Newhart can answer that better than I. I have had no experience with them. I believe he states he can cut down the outside noises about 20 to 30 dcb. at certain frequencies. Perhaps this question had better be answered by Dr. Newhart.

DR. MOSHER: Does it make them practical, in your judgment?

DR. BUNCH: There are some cases where it would be impossible to use the soundproof booth to get accurate results.

CHAIRMAN HILL: May we ask Dr. Newhart to say something about the portable booth — its value?

DR. NEWHART: Several types have been constructed, and they are gradually improving them. Tests made by Dr. Beasley a few weeks ago seemed to show that they give very satisfactory service, reducing the extraneous noises about 20 dbc., and so, for practical purposes, or clinical work, they do very well.

CHAIRMAN HILL: Dr. Fowler, "what is a decibel?"

DR. FOWLER: I think for our purposes a decibel may be considered as the smallest change in intensity that can be perceived as such by the ear. The decibel is measured electrically; it is a change in electrical energy. You can't measure the sound itself but you can measure the energy necessary to produce the sound. The decibel is the standard accepted unit of measure for sound.

DR. BARNHILL (from the floor): What is the number of decibels for normal hearing, according to your standards?

DR. FOWLER: The number of decibels for average normal hearing; the number required at the threshold of normal hearing would be zero decibels. One decibel over the threshold would represent the smallest change in intensity perceptible between the zero setting and 1 dcb. setting. Untrained ears often fail to detect this faint change. The average normal hearing level was obtained by determining the amount of sound pressure that a large number of apparently normal ears could just detect at the different frequencies.

DR. BARNHILL: We say that a person loses so many decibels. How many would he have to lose to lose all? What is a normal number?

DR. FOWLER: How many decibels in the range of hearing, you mean? I think that is unlimited. The ceiling is unlimited, but if the intensity increases much over the threshold of feeling the patient will feel pain from the trauma with vibration.

DR. BERRY: Dr. Fletcher can tell the amount of sound there is at the threshold.

DR. FLETCHER (from the floor): I was very much interested in the discussion. In answer to your question. they put the zero decibels at the threshold, and call it the threshold,

and measure from that level up to where the sound gets so loud it begins to hurt; that is, about 120 to 130 dcb. At 64, you only have half that range. The reason for that is that it takes about 40 or 50 dcb. more sound, measured in physical units, to make the ear hear the sound at 64 than it does around 2,000.

DR. BUNCH: I have here records of four ears. The lines of circles in each part represent the threshold measurements made with the soundproof doors closed. I immediately opened the doors and retested the patient, and the lines of crosses represent the test with the doors open.

Most of you know where our soundproof room is located. You will see in each chart there has been very little change caused by opening the doors for the high tones. With the door open, the low tones are cut down less than those in the middle range. In the middle range there are from 20 to 30, and in some cases 35 units loss, especially at 1,024.

To make an adjustment by deducting 10 or 15 dcb. through the whole range would not take these inequalities into consideration. Hearing losses exist in the area between the two lines, and one would not be able to determine those hearing losses if he worked in a room which was not soundproof.

DR. MOSHER: Thank you, Dr. Bunch. I think that is the best thing you have said so far.

CHAIRMAN HILL: Here is a question from the floor:

"Ask Dr. Berry to discuss the value of bone against air conduction."

DR. BERRY: As I understand Dr. Bunch, he uses only the 512 pitch for testing bone conduction; I use the whole range. It helps me greatly in contrasting between the air and the bone graph and also when considering the application of hearing aids.

CHAIRMAN HILL: One more question on audiometers, and then we will go on to hearing aids.

Dr. Mueller, "what does the audiometer do that tuning forks do not do?"

DR. MUELLER: First of all, it enables one to get a graphic record, for record purposes and for making comparisons, and has higher frequency range than tuning forks.

DR. FOWLER: It also has a higher intensity range. As a matter of fact, you can make a graph with tuning forks if you calibrate them properly.

DR. NASH: I should say it also had the factor of uniformity.

DR. MUELLER: I should like to know whether Dr. Nash means that one audiometer is just like another, regardless of location. If he sends a patient from his office to a man in California, and audiograms are repeated, would they agree necessarily? I don't believe so.

DR. NASH: That is not the idea. The idea is that audiograms are at least a basis of comparison. Two audiometric tests taken in different parts of the country may have individual variations but they represent more of a standard than individual tuning fork hearing tests.

DR. HAYDEN (from the floor): May I add one thing? It seems to me that the great advantage of audiometers over tuning forks is the reversibility of audiometers and irreversibility of tuning forks. The curve of intensity of a tuning fork is automatic and not under control of the operator. With the audiometer you can reverse your intensity and determine exactly, by repeated tests, where the intensity is.

DR. FOWLER: And the same thing can be done with tuning forks, if you use them properly. The tone may be made to reappear by quickly moving the fork close to the ear.

DR. GOLDSTEIN (from the floor): I don't agree with that. I challenge that last statement absolutely. A tuning fork has no constant tone intensity, and it dies out as it goes along. Unless you electrify that tuning fork, I don't see how you can maintain a definite volume of intensity.

DR. HAYDEN: Dr. Goldstein will not stay on a constant line of optimum tonus.

DR. BUNCH: In the history of Otology there has been committee after committee appointed for the purpose of standardization of tuning fork tests. The last one, I think,

was in 1935. At that time they were still trying to tell otologists how to use tuning forks, indicating that since 1880 there has been no standardization. It seems to me there is an excellent opportunity of getting standardized tests, providing they are supervised by competent otologists.

CHAIRMAN HILL: I submit this question from the floor: "What is the occupational significance of a loss in hearing at 4,096 d.v.?"

DR. FOWLER: It depends on the occupation. If the loss at 4,096 is suffered by a piano tuner, who must tune by listening to that frequency, it will constitute a disability; if the occupation is concerned with hearing ordinary speech, it probably won't interfere very much.

CHAIRMAN HILL: I think we have consumed considerable time on audiometers.

DR. GOLDSTEIN (from the floor): Before you get away from audiometers, may we have some idea about the problem of cost in the production of an audiometer? There are 75 to 85 otologists in St. Louis. There are six or seven different types of audiometers that we use in the tests for individual audiograms. There are 15 audiometers in St. Louis; eight are in the possession of individual otologists; what do the 60 otologists do for audiometric tests?

One of the main purposes of this question is that the cost of the audiometer today is so high that many otologists cannot afford them in their own armamentarium, and the expense of production of the audiometer does not compare with the cost of the audiometer to the otologist. It is about time that the otologist was given a little more consideration.

CHAIRMAN HILL: Dr. Wherry!

DR. WHERRY: If we are to provide a universal means of documenting hearing, and I use the word "documenting" advisedly, the audiometer, or some other machine, must become a universal means of providing that documentary evidence.

This morning the question was raised as to including the 64. It costs the producers, as I understand it, about $50 to include this tone. I think Mr. Carter will substantiate the

statement that if a pure 64 is put in, you have much difficulty in getting a pure 256, and up. On the other hand, they can start at 128 and go to 8,000, maintaining a pure tone. Likewise, there is an expectance saturation point in this country of about 4,000 to 4,500 audiometers.

Three years ago, when this committee was started, there were less than 600 audiometers in use. Today there are almost 3,000. The first audiometers cost from $500 to $600; the cost now has been brought down to about $240. I am quite sure that as this saturation point is approached, the cost will again come down. I am rather of the opinion that with an audiometer production approaching the maximum, the cost can be reduced below the $240 limit, providing that we maintain two standards, a research audiometer, which Dr. Guild will have to have, and one for clinical work.

The next answer, and I think this is very vital, is the fact that the otologist must be educated to the idea of getting in line with this effort to provide a working, usable standard. All one has to do is to travel over the country and watch different otologists check hearing with tuning forks, to recognize that it is a pathetic situation. First, tuning forks are rusty and allowed to deteriorate. All sorts of energy is injected into that tuning fork, all sorts of different degrees of pressure used, and the average tuning fork test from the standpoint of the courts is a joke.

DR. MOSHER: Do you expect that an audiometer price ever will come down to a hundred dollars?

DR. WHERRY: Here is one unfortunate factor. Better audiometers are being made today, but when once purchased it is likely that the same individual will not purchase another for several years; therefore, the audiometer manufacturers have to carry some sideline. They are approaching the hearing aid picture and if the two can be combined, then, Dr. Mosher, I think that the price will come down. I have been advised that it costs about a hundred dollars to build a good audiometer; that the cost over and above that embraces sales and all other factors that come into profits; but to become universal, we must keep in mind two audiometers, research and clinical.

CHAIRMAN HILL: There has been a question submitted that I am going to turn over to Dr. Proetz: "What are the worst features of the present day hearing aids?"

DR. PROETZ: My answer is "bulk."

CHAIRMAN HILL: Dr. Nash, "Can makers of hearing aids be persuaded to sell them only on the recommendation of the otologist?"

DR. NASH: For business reasons, they cannot be so persuaded. If they depended on the recommendations of the otologists for their business, they would do insufficient business to make a profit.

Business is done through their salesroom and salesmen, and they solicit among the hard-of-hearing.

CHAIRMAN HILL: Dr. Nash, "Several companies have indicated their willingness to have my patients try out instruments in my office, but trial in my office alone is not sufficient. One company refuses. Can they be persuaded to a reasonable trial system?"

DR NASH: I have talked to the manufacturers about this, and I am converted to their point of view. They feel that the time trial system is bad; that it is bad for the purchaser and bad for the manufacturer. If a patient after trying out a number of hearing aids will pick out the one that best serves him, I do not think that many companies would object to its being tried out in the doctor's office; but they feel that the patient can tell within three or four hours whether he is going to like that hearing aid, or whether he isn't. If he purchases it, he is apt to make himself like it, but if he keeps it on trial for three or four weeks, he is going to get the opinions of all of his disgruntled friends, and be very unhappy.

The trial system means that manufacturers lend out many hearing aids and they are going to have many secondhand instruments, an economic problem that they do not wish to assume.

DR. BERRY: I am not quite in agreement with Dr. Nash. I think that the patient must try it longer than three or four hours. I personally wouldn't be able to tell whether I liked

an instrument in that short time. I would want to try it under perhaps three different conditions. I would want to try it in the quiet of my own home; in noisy surroundings; and in some auditorium or gathering where there was a single voice at some distance. Each one of those qualifications is different from the other and cannot readily be obtained in two or three hours of trial.

DR. JOHN H. FOSTER, Houston, Tex. (from the floor): I wonder if I, as an outsider, could say something? I think Dr. Berry has expressed the viewpoint of nearly everyone who has tried out different hearing aids and needed them very much. No patient in the world except one with a pure case of otosclerosis that isn't too far advanced can tell whether a hearing aid is going to be satisfactory to him in general use, in the office, and I wouldn't recommend a hearing aid to any patient where they would not let him take it out on trial.

DR. FOWLER: A manufacturer's claim that everyone hears perfectly with this hearing aid is a little stretching of the truth.

CHAIRMAN HILL: Dr. Berry, "What is the basis for determining the hearing aid most suitable for any individual patient?"

DR. BERRY: There are two ways of determining the suitability of a hearing aid; the trial and error system is one, and the other resembles a prescription for the instrument. We are trying more and more to write a prescription in terms of an audiogram for an instrument. In some cases this has proved very successful. I think several men on the panel will agree they can send a patient's audiogram to the manufacturer and the manufacturer can fit and send back a hearing aid which the patient will accept and keep. The trial and error system is a little parallel to picking up a pair of glasses and seeing if they fit or not. If there are glasses enough, and if you are patient and persistent, you may get a very good fit.

DR. FOWLER: I think, as far as obstructive deafness is concerned, you can prescribe from the ordinary audiogram. I think it is folly to think you can prescribe for certain types of nerve deafness by the ordinary threshold audiogram. How-

ever, I believe that if you make proper tests of loudness in the nerve-deafened areas, you can then prescribe definite characteristics for a hearing aid even for nerve deafness but, as with eyeglasses, you may do a perfectly scientific job and yet the user may not accept what you have prescribed.

DR. NASH: I should like to take exception to the word "prescribe." I still feel a hearing aid is never prescribed, that it is fitted according to the trial and error method. There was a time when we felt that a long bone conduction individual was best fitted by a bone conduction instrument, and that a short bone conduction individual was best fitted with an air conduction receiver, but we have learned that, although a long bone conductioned individual may hear well with a bone conduction instrument — he may hear better with an air conduction receiver, and this throws the whole thing back to the trial and error method.

I still feel we do not "prescribe" hearing aids.

CHAIRMAN HILL: Dr. Bunch, "Could the Bureau of Standards make a classification of hearing aids and their different combinations in terms of their physical characteristics?"

DR. BUNCH: I think there is no doubt that the Bureau of Standards could do it. They have the equipment for testing the transmission characteristics of the different parts. I doubt very much if the Bureau of Standards could attempt to control the advertising policies of the companies. For that reason I think that the Council on Physical Therapy, through its committee, can handle the situation better by using unprejudiced referees to whom they can send equipment for checking, and it can also use its influence as an advertising control.

DR. MOSHER: Who is to control the advertising, Dr. Bunch?

DR. BUNCH: The Council on Physical Therapy, through the rules they have established.

MR. CARTER: Whether or not the Council can exercise control, it is a persuasive effort, at least.

CHAIRMAN HILL: How much service is necessary on hearing aids? How much is service a factor in a particular type of aid?

MR. CARTER: Service, of course, is very important. I should think that a person acquiring a hearing aid should investigate very carefully into the amount of service that is likely to be available. I imagine that the cost of service is a matter between the purchaser and the manufacturer.

DR. BERRY: I discussed this question with an agent and his company will service their instruments one year free.

CHAIRMAN HILL: Dr. Nash, here is a very interesting question which was submitted some time ago. I will read it slowly because it is rather long:

"A hard-of-hearing individual goes to a salesman to purchase a hearing aid. The salesman advises his prospect to consult an otologist and obtain an audiogram. This he refuses to do on the basis of the extra expense that will be incurred; therefore, the salesman assumes the financial responsibility, refers the customer to an otologist for the audiogram, and later for an impression of his external auditory canal, and final check-up. For this service the salesman pays the otologist $10. Is this ethical and advisable from the standpoint of the otologist?"

DR. NASH: I don't know whether it is ethical or whether it isn't, but I can say very definitely that it is not advisable. If that thing happened to me, I should attempt to educate the salesman. My feeling is that before an individual buys a hearing aid, at least for the first time, he should have a complete otological examination, and I would educate the salesman to know the difference between an otological and an audiometric examination.

My opinion is that an otological examination should entitle the patients to at least four considerations: First, there should be an otological inspection to make sure that an individual with aural polyps or an acoustic tumor isn't unknowingly fitted with a hearing aid. Those things have happened. Second, there should be an audiometric examination. Third, there should be the general functional hearing tests, tests of whisper and conversation, and the tuning forks tests by air and bone conduction; and, fourth, the patient ought to have the opportunity to sit down with somebody who doesn't want to sell him something and get some real honest advice.

DR. MOSHER: Can he find that man?

DR. NASH: Yes, I think so. The patient can discuss with the otologist his requirements on the one hand, and his disability on the other, and together they can determine whether he needs a hearing aid, lip-reading, medical attention or a change of occupation.

DR. FOWLER: Why shouldn't a man with aural polyps or brain tumor have the advantage of a hearing aid? He might want to use it in spite of the brain tumor or polyps. He might not consent to having his polyps taken out.

DR. NASH: Certainly, he can have a hearing aid, but let's diagnose the condition first.

CHAIRMAN HILL: Another question: "When an otologist refers a patient to a hearing aid salesman and the latter succeeds in selling the hearing aid, the salesman refers the patient back to the otologist for a plaster impression of the patient's external canal, and later for a hearing check-up with the aid in use. For this service the salesman pays the otologist, again, $10. Is this ethical and advisable from the standpoint of the otologist?"

DR. BERRY: Sometimes the ethics of a situation are difficult to decide. If one strives honestly and openly to serve the best interests of his patient, he cannot go far wrong. If this patient is your own patient and he goes to the agent and then comes back to you, you would naturally have a financial arrangement with him anyway. Now, if the agent has to charge a certain fixed sum for the hearing aid, and out of that can come the expense of such a cast, then if the agent wishes to reduce his price the amount of your proper fee, and you get it, and the patient knows about it, and the agent knows about it, I can see nothing unethical about that. But I would try to educate the agent, as Dr. Nash has said, to let the doctor carry his own financial arrangements with the patient. Of course, the doctor must strictly avoid any financial arrangement with the agent, either direct or implied, which could prejudice his service or his advice to the patient who consults him.

MR. CARTER: As a representative of the American Medical Association, I desire to make a statement regarding the ethical interpretation.

There are three methods of prescribing spectacles in general use:

1. The ophthalmologist makes an examination and refers the patient to the optician with a prescription. The optician grinds the lenses, fits them to the patient, and the patient is referred back to the ophthalmologist for a final check-up. The patient pays the ophthalmologist for the examination and the patient pays the optician for the spectacles. This is considered the most ethical method.

2. The ophthalmologist makes the examination and sends the prescription to the optician. The optician grinds the lenses and sends them and the frames to the ophthalmologist, who fits the spectacles to the patient. The ophthalmologist charges the patient for the examination and for the spectacles. The ophthalmologist, in turn, reimburses the optician, according to contract. The patient knows how much he paid for the examination and the spectacles. This is an ethical method.

3. The ophthalmologist makes the examination and refers the patient to the optician with a prescription. The ophthalmologist charges the patient for the examination. The optician grinds the lenses, fits them and charges the patient for the spectacles. The optician gives a certain portion of the selling price (commission) to the ophthalmologist. This is an unethical method because the patient does not know that the ophthalmologist is receiving extra pay for his examination and service.

If the Council finds out about practices like the latter in the case of hearing aids, it will be obliged, under the present rules, to take the hearing aid off the accepted list.

DR. MOSHER: Why can't the physician do something for a patient, especially an old patient, without tacking on an extra charge? It doesn't appeal to me. It is getting commercial.

DR. BERRY: Making the impression is an extra service.

DR. MOSHER: How much is that worth in time?

DR. BERRY: It may take from three-quarters of an hour to an hour to do, and do well.

DR. MOSHER: When you have an old patient you have been treating for years, and he comes to you for this impression, do you feel you want to charge him something?

DR. BERRY: Yes. This is a skilled and time-consuming service that I render him. If he cannot afford it, there is no charge.

CHAIRMAN HILL: This question is from the floor: "How well qualified are the hearing aid salesmen to prescribe the proper instrument?"

DR. NASH: My contention is that the salesman does not prescribe the instrument. Nor does the doctor. It is fitted by the trial and error method, and I think that most of the salesmen are qualified to do that.

DR. BERRY: I agree to the difficulty about "prescribing," but the difficulty with "trial and error" is that the agent will sell a hearing aid, and if the purchaser doesn't like it, his only recourse is to try another.

DR. NASH: The situation is deplorable, but what are we going to do about it?

DR. FOWLER: The difference is this: When an otologist sends a patient for a hearing aid, he does not limit him to one hearing aid. He tries him out with several hearing aids, if there is any question as to selection, and that is the difference. No agent will try him out with several makes of hearing aids, while the conscientious otologist will.

CHAIRMAN HILL: How do you feel about the fitting of hearing aids by use of the audiogram, Dr. Bunch?

DR. BUNCH: It seems to me that is the only logical way. If one knows the amplifying characteristics of the hearing aid and the patient's hearing loss as determined by the audiogram, he should be able to determine what hearing aid will compensate the losses that are shown.

DR. FOWLER: I object to the word "fitting" in relation to the audiogram. I think that the only way the hearing aid is "fitted" is to adapt it to the external auditory canal.

CHAIRMAN HILL: Dr. Fowler, "In prescribing a hearing aid for a case of combined deafness with prolonged bone conduction, can you objectively determine whether to prescribe an air conduction or a bone conduction receiver?"

DR. FOWLER: You can't diagnose a combined deafness in a case where the bone conduction is normal or prolonged.

DR. KENNETH M. DAY (from the floor): When these bone conduction instruments first came out, I tried one. I have mixed deafness, otosclerosis, prolonged bone conduction for low tones. When I first tried the bone conductor, it was wonderful; but, taking an audiogram with my bone conductor, I couldn't hear as well as with an air conductor.

I believe this question should be answered, and that is a point where the audiometric chart of your bone conduction scale is most important. If you find that your bone conduction drops at 1,024 and 2,048, below the air conduction, you are certainly going to hear better with air conduction.

DR. FOWLER: I will then answer the question thus: It depends upon how much it drops at the different frequencies. In spite of the fact that the patient will, because of the prolonged conduction for the low tones, hear speech better with bone conduction receivers, it does not follow that he will accept the B. C. receiver. As a matter of fact, these cases with the drop in the middle and high frequencies usually get along better with an air conduction hearing aid.

DR. BERRY: Dr. Day and I speak with the background of personal experience. Our bone conduction is prolonged but we get better results from air conduction receivers. In listening to music, for instance, there is a certain amount of distortion we get in the bone conduction set that we do not get by air conduction.

CHAIRMAN HILL: "Is it ethical to accept hearing aids from the manufacturer for testing in your own office and to charge for this service?"

DR. FOWLER: I don't think there should be any question about that. A physician charges a fee for consultation, and he should charge a fee for people who consult him about anything, whether a hearing aid or anything else.

CHAIRMAN HILL: Dr. Berry, "When should a hearing aid be recommended?"

DR. BERRY: When the hearing is so low as to handicap the patient in his environment.

DR. MOSHER: How about lip-reading? When do you prescribe that?

DR. BERRY: Lip-reading is of service to anyone at any time, even people who hear well.

CHAIRMAN HILL: "How do the present carbon aids compare with the tube aids?"

DR. BERRY: I personally find that the carbon aids serve better for low degrees of hearing impairment, while the vacuum tube aid helps more in the greater degrees of hearing impairment and especially in higher tones.

DR. MOSHER: What is a "reasonable" price for a hearing aid?

DR. BERRY: What the market charges. That is all we can get now.

DR. BUNCH: One of the hearing aids that has been approved by the Council on Physical Therapy sells for $29.95. It is the Zenith. It plugs into the wall. It is not a wearable aid.

CHAIRMAN HILL: Dr. Berry, "Is the otologist or some other agency best qualified to make plaster molds for the earpieces?"

DR. BERRY: I think the otologist should be.

DR. MOSHER: Isn't the dentist better?

DR. BERRY: I think not. He doesn't know what the inside of the ear canal looks like.

CHAIRMAN HILL: Dr. Bunch, Can all hearing loss be compensated with fittings by hearing aids?

DR. BUNCH: The answer is no; otherwise there would be many people with very marked losses of hearing, so-called "stone deaf," who would be wearing hearing aids. Those with slight hearing losses, usually around 30 to 35 dcb. in the speech range, usually hear so much noise with their hearing

aid that it is impossible with the present aids to get any satisfaction through their use. In between those limits, there are a great many who can get much benefit. There are cases of marked dips in the range which may not be shown with the octave series of the audiometer, which will prevent patients from being properly fitted.

CHAIRMAN HILL: "Is there any test which will determine roughly whether a patient will be unable properly to secure an adequate fit?"

DR. BUNCH: You use the word "roughly." If a patient is unable to hear a loud voice close to the ear, he will not have an easy time selecting a hearing aid.

DR. FOWLER: I object to that. I have seen many cases where you could use a very loud noise, shout near his ear, and could not get intelligible articulation, and yet the patient was able to use a hearing aid with a great deal of satisfaction.

DR. BUNCH: I never have found one.

CHAIRMAN HILL: "Is it true only those who suffer from deafness of the conductive type may be fitted with the proper aid," Dr. Bunch?

DR. BUNCH: (Slide) This slide shows the audiograms of three patients which certainly indicate perceptive type of deafness. All are wearing hearing aids with a high degree of satisfaction. Certainly, these are not conductive type cases, and I think that it is very easy to fit this particular type of deafness with a wearable hearing aid.

CHAIRMAN HILL: Dr. Fowler, "Is it true that long use of a bone conduction aid will destroy or impair your air conduction?"

DR. FOWLER: No more than the use, and the long use, of an air conduction aid.

CHAIRMAN HILL: "Will the use of an aid improve or make worse acoustic capacity, or will it regenerate the nerve capacity?"

DR. FOWLER: It will do neither and cannot regenerate the acoustic nerve. However, if someone operates an amplifier at tremendous intensity for a very long time it may be harmful. Then, like all intense prolonged vibrations, it will cause acous-

tic shock and slowly or quickly destroy particularly the high tones and more.

CHAIRMAN HILL: Is there any danger in using a hearing aid during a thunder storm, Dr. Berry?

DR. BERRY: I take the position there is danger. Some do not support me in that. My idea is that the amplification will make still louder the thunderclap, and it is against the ear. I have never had it happen, but I wouldn't want to be exposed to a loud thunderclap with my earphones turned on.

DR. FOWLER: I don't believe that the noise from a thunderclap will hurt a man with deafness, or without deafness, unless its origin is near. It is the amount or intensity of the shock which largely determines the trauma. If one has obstructive deafness, the sound will appear less than to a normal ear and, therefore, it will hurt less. If one has nerve deafness, the sound will go into the inner ear even though the person is so deaf he does not hear it. I don't think there is as much danger from acoustic shock from thunder, generally speaking, in a deafened ear as there is in a normal ear.

DR. MUELLER (interposing): Is there a possibility that the hearing aid may overamplify the low tones in a thunderclap?

DR. MOSHER: Do you take off your hearing aid during a thunder storm?

DR. BERRY: I don't usually wear it, except inside a house, where the thunder storm wouldn't bother me anyway.

DR. FOWLER: It is hardly possible for the small earpiece to amplify the low tones of thunder sufficiently to a deafened ear to overreach the margin of safety.

DR. BERRY: I want to ask Dr. Fletcher a question. Does amplification increase the amount of sound I get in a thunder storm over what Dr. Fowler gets in a thunder storm?

DR. FLETCHER (from the floor): For most hearing aids it is a protection because they stop up your ear and won't let the sound in normally, and they have a certain capacity limit and the sound can't go above that because the equipment won't let it, and that is usually below what you get in a very high acoustic shock. The chances are you would get more acoustic shock with it out of the ear than if you had it in.

DR. PROETZ: I should like to have the second half of the question regarding improvement of hearing after using any stimulating apparatus answered.

DR. BUNCH: I can say that there has been no evidence in the literature anywhere that the actual hearing has been improved.

If someone were to shout Hottentot expressions in my ear, I would hear them but wouldn't understand them. If someone were to speak to a child who had never understood speech but who had hearing, the use of such a device would not improve his auditory acuity, but his understanding, the mental capacity, might be changed.

DR. PROETZ: I had reference to regeneration. It has been maintained that sometimes this occurs.

DR. FOWLER (interposing): The answer is no.

MR. CARTER: I would say there that insufficient evidence has been submitted to substantiate anything like regeneration of the nerve by an external stimulus. Incidentally, the evidence required by the Council to substantiate such a claim would have to be controlled. The Council would require reports on two large groups of individuals, that is, individuals who were deaf or deafened; one group for controls, and then another group for treatment.

CHAIRMAN HILL: "On which ear should I wear a hearing aid?"

DR. BERRY: As a rule, a bone conduction receiver may be used on either side, interchangeably. In the case of an air conduction receiver, use the poorer ear if the response is satisfactory, thus freeing the better ear for unaided hearing. If both ears are nearly the same and quite impaired, the hearing aid is usually placed on the better ear. With very poor hearing, some are recommending that both ears be fitted, each with an individually adjusted earpiece. This is a binaural instrument. A 20 per cent gain is claimed over the single earpiece, and sounds seem better balanced, more natural and less tiring to listen to.

DR. FOWLER: In binaural nerve deafness, the A.C. receiver generally is more useful in the better ear. In obstructive

deafness, when a bone conduction receiver is used, the practice is to use it on one and then on the other side, to get away from the continued pressure on one side of the skull.

CHAIRMAN HILL: Dr. Berry, "Should I use a hearing aid though I get so much noise it confuses me?"

DR. BERRY: It should be adjusted so that it is not noisy.

CHAIRMAN HILL: "What aid is small and invisible when stuck in the ear, and makes one hear perfectly?"

DR. FOWLER: None.

DR. BERRY: That should be qualified. We have all used cotton drums soaked in oil to close over a perforated drum with some success.

CHAIRMAN HILL: I think it refers to some advertising. "What aid is small and invisible, which is stuck into the ear and makes you hear perfectly?"

DR. BERRY: None; no qualification.

CHAIRMAN HILL: Here is a question which is a good one: "What type of nerve deafness gains most from the fistulization operation? How much gain in decibels is offered if a good operative result is secured in this favorable type? Can one get similar improvement from hearing aids?"

Dr. Fowler, will you answer those questions?

DR. FOWLER: I think the type of deafness most suitable, if any, for the fistulization operation is the pure conductive type. In the present stage of the art, the improvements that are gained from the fistulization operations reach as high as 20 and 30 dcb, and sometimes more, temporarily. No case has gone long enough postoperatively to give us the percentage that is going to maintain an improvement beyond a few months or a year.

When we have examined cases that have gone on two and three years and have had repeated accurate tests, we will then, and only then, be in a position to know how many are getting a sustained improvement.

I have collected several cases, most of which have been in the past reported as improved by this operation; none, so far, has maintained the improvement.

CHAIRMAN HILL: "Who makes the best hearing aids?"

DR. NASH: Well, there are 11 hearing aids that have been accepted by the Council on Physical Therapy.

DR. FOWLER: I didn't include in my answer the gain from a hearing aid as compared to fistulization. There is no person as far as we know who cannot get from the hearing aid as much or more than they can gain from the fistulization.

DR. BERRY: Furthermore, the case helped most by fistulization is the type of case that is especially helped by a hearing aid.

CHAIRMAN HILL: This has gone along for quite some time and you have been very indulgent. I will close this discussion of the panel now and ask Dr. Mosher to summarize.

SUMMARY.

DR. MOSHER: I do want to say only a few words.

First, I want to thank Mr. Carter for coming here. He has been a tower of strength.

I was somewhat responsible for this "Information Please" panel. What I wanted to get was names called in the open. What are the reliable audiometers and the reliable hearing aids? I have been asking for this information from the floor of these meetings for the last three or four years. Today we have gotten something definite on these points. I am very much obliged to the gentlemen who had the courage of their convictions and have given us this information.

REFERENCES.

1. Progress Report of the Consultants on Audiometers and Hearing Aids of the Council on Physical Therapy of the American Medical Association. *Jour. A. M. A.*, 115:854-857, Sept. 7, 1940.

2. Tentative Minimum Requirements for Acceptance of Electric Hearing Aids. *Jour. A. M. A.*, 114:1881, May 11, 1940.

3. *Jour. A. M. A.*, 114:1634, April 27, 1940.

4. Minimum Requirements for Acceptable Audiometers. *Jour. A. M. A.*, 112:732, Feb. 25, 1939.

5. The laboratory investigating audiometers for the Council is now testing the instruments based on a standard common to all outstanding acoustical laboratories in the United States. The value for threshold of hearing is within + or — 3 dcb., which is well within the observational error when making an audiogram.

POLYPOID TUMORS OF THE ESOPHAGUS. REPORT OF TWO CASES.*†

DR. JOSEPH J. MAHONEY, New York.

The esophagoscopist is from time to time confronted with the problem of making a differential diagnosis between benign and malignant lesions of the esophagus. Polypoid changes in carcinoma of the esophagus are not uncommon; however, it would appear from the literature that the occurrence of benign polypoid lesions is unusual. These two cases will illustrate the difficulty one may encounter in judging the nature of the lesion by its appearance alone.

The earliest case of a polyp of the esophagus treated by the oral route was recorded by Alexander Munro in 1763. Here, the polyp was ligated and was allowed to pass on through the gastrointestinal tract. In 1818, Dubois reported a case of esophageal polyp which he ligated, and his patient regurgitated the growth into the larynx and died suddenly. Two additional esophageal polypi were reported by Morrell MacKenzie in 1874. Vinson,[1] 1922, reported a case of a man, age 62 years, who repeatedly regurgitated and swallowed a polyp, but at no time had any dysphagia. Dyke,[2] 1927, reported the case of a woman, age 50 years, who suffered from regurgitation and loss of strength. A diagnosis of esophageal stricture was made and a gastrostomy was performed. The patient died and an autopsy revealed a large polyp attached to the anterior wall of the esophagus at the level of the cricoid cartilage and extending down beyond the cardiac orifice. Patterson,[3] 1932, made a comprehensive study of benign lesions of the esophagus, 26 out of a total of 61 being classified as polypi. She states that they are always pedunculated, the pedicle generally being long, thus allowing considerable mobility. Chitty,[4] 1938, reported a case of polyp of the esophagus in a Chinese male, age 26 years, who was admitted to the hospital because of paroxysms of coughing. On examina-

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†From the Department of Otolaryngology of Columbia Presbyterian Medical Centre, New York.

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tion he was found to have a large fleshy mass protruding from his mouth. This apparently had caused him no symptoms up until the time he was seen by his physician. A lateral esophagotomy was performed and a large polyp was removed from the upper esophagus.

SYMPTOMS AND DIAGNOSIS.

The usual symptoms observed are dysphagia, regurgitation and salivation. One may also observe retrosternal pain or discomfort. Paroxysms of coughing have been noted. If the polyp is of unusual size, difficulty in breathing may occur.

In the presence of the above symptoms, the patient should have a careful check-up of his larynx and esophagus by mirror examination. Swallowing function tests should be carried out by the administration of barium. This will accurately outline the esophagus and determine the presence of any lesion. The studies are not completed until an esophagoscopy and biopsy have been performed.

REPORT OF CASES.

Case 1: C. L., a white man, age 73 years, was admitted to Presbyterian Hospital, Dec. 2, 1938, with a complaint that he had had difficulty in swallowing for three weeks. For six months prior to admission he had complained of heartburn and a choking sensation. He had marked difficulty in swallowing anything but fluids and soft foods.

Physical Examination: The patient was an elderly white male. Temperature 99°, pulse 84, respiration 22, blood pressure 118/84. Ears negative, nasal passages clear, oropharynx tonsils small. Larynx and hypopharynx: there was a small mass about the size of a walnut posterior to the left arytenoid. The left vocal cord was fixed in adduction. The right vocal cord was freely movable. Heart and lungs normal, abdomen negative.

Fluoroscopy and X-ray examination of the upper end of the esophagus by Dr. Kasabach revealed the following: "There was a persistent defect from the level of the fourth cervical segment down to the seventh cervical vertebra. X-ray diagnosis: This has the appearance of carcinoma of the esophagus, situated in the posterior-cricoid region and

extending down to the suprasternal notch. X-ray of chest: Shadows in the mesial zone of the right lower lung field are compatible with bronchopneumonia."

Course: An esophagoscopy was performed by Dr. John D. Kernan, and it was noted that a large tumor mass could be seen which appeared to fill the lumen of the esophagus at the cricoid level. A biopsy was taken and the histologic picture of this section was of such nature as not to warrant a diagnosis of polyp nor of malignancy. A second esophagoscopy was performed three days later and two biopsies were removed. These were examined microscopically by Dr. A. P. Stout, who reported the following:

"*A.* This section is a portion of the main mass taken for biopsy. It is covered by stratified squamous epithelium which shows hyperkeratinization and hyperplastic changes. Many of the cells show vacuolization. The superficial epithelial cells are very large and resemble bleb formation. There are two small, partly healed wounds, from which probably the initial biopsy was taken. In this section one can see no invasion of the basement membrane.

"*B.* This section represents a complete transection of the removed tissue. Here again, in the surface epithelium and underlying stroma there are isolated masses of cells which show considerable variation in size and form. Some of these are round, oval and spindle-shaped. Rare mitotic figures are seen, only two or three being observed. One small imperfectly formed pearl is found. This tumor comes very close to but does not actually touch the covering mucosa. Whether this is an epithelioma which has developed in a pre-existing polyp or whether the polyp has formed as a result of the irritation of the epithelioma remains problematical."

Diagnosis: 1. Polyp of the esophagus; *2.* squamous-cell epithelioma of esophagus.

The patient showed signs of marked esophageal obstruction and another esophagoscopy was performed. A piece of tissue about 1.5 cm. in diameter was removed and sent to the laboratory for further study. The latter revealed a polyp of the hypopharynx without any evidence of malignancy.

Three weeks after admission, a gastrostomy was done in order to treat more adequately the esophageal lesion. Five days postoperatively his temperature rose to 104°; he complained of no pain. Physical examination at that time revealed temperature 102°, pulse 95, respiration 24. Lungs: Dullness at both bases, right side more marked than left, extending up to the right axilla. There were many bubbling rales at both bases. Impression: Bronchopneumonia. White blood count at the time was 18,200. Examination of the sputum revealed pneumococcus type VIII. A few days later he developed a leathery friction rub in the right axilla. X-ray examination at this time by Dr. Kasabach was as follows: "There is an area of homogeneous density in the lower two-thirds of the right lung field compatible with consolidation of the right lower and middle lobes, and possibly a moderate amount of fluid in the right pleural space." The patient's condition gradually became worse and he died on Feb. 3, 1939.

An autopsy was performed by Dr. Stewart, and an examination of the hypopharynx and esophagus revealed a large polyp extending down into the esophagus from the hypopharynx, which was about 1.5 cm. in diameter. Histological examination of the polyp revealed a few irregular large cells suggestive of carcinoma. Sections of the wall of the hypopharynx and esophagus beneath the polyp showed characteristic tumor cells which had deeply invaded the underlying tissues.

Case 2: H. E., a white male, age 54 years, was admitted to Presbyterian Hospital on Jan. 8, 1937, complaining of difficulty in swallowing cold fluids, and increased salivation. This has been present for the past seven years and has become more marked recently. He has complained of no pain, and there has been no marked loss of weight.

On the day following admission esophagoscopy was performed by Dr. John D. Kernan. At the level of the aortic notch a firm mass was observed protruding into the esophagus from the anterior wall. Near the lower end of the esophagus a similar mass was seen, which appeared to be lobulated. A biopsy was taken from each mass. Microscopic examination of the specimens revealed that these were esophageal polypi.

On Feb. 26, 1937, patient was readmitted and X-rays of the esophagus were taken by Dr. Ball, in both oblique and lateral positions. At the suggestion of Dr. Crump, a sausage skin filled with barium was passed in order to outline the polypoid masses. This demonstrated two areas of filling defect located on the anterolateral wall about 15 mm. in diameter at about the level of the fourth dorsal vertebra. Esophagoscopy was repeated on March 1, 1937, and about 30 cm. from the teeth a large mass of polyps was found. The esophagus was dilated so that a 10 mm. esophagoscope could be passed.

A few weeks later an attempt was made to pass a silver wire over the proximal polyp in order to constrict its base but it was found that the base was too broad for this procedure.

On April 7, 1937, a short esophagoscope was again passed and four radon seeds were implanted in the polypoid mass located at the upper third of the esophagus. X-ray examination of the esophagus following the implantation of radon demonstrated that the radon seeds were separated by about a distance of 7 mm. and were situated at the desired level.

The patient was readmitted on Sept. 20, 1939, at which time an esophagoscopy was performed and no marked change was observed. A flexible gastroscope was passed by Dr. Crump and the appearance of the gastric mucosa was that of a low grade gastritis. Fluoroscopic examination and films made of the barium-filled esophagus showed no essential changes compared with previous examination. The patient was placed on ambulatory ulcer diet, which has caused some diminution in salivation.

COMMENT.

The preceding two cases demonstrate the problems that arise in arriving at an accurate diagnosis in esophageal lesions of this type. The first case probably represents polypoid degenerative changes arising in a primary malignancy. The importance of repeated biopsies in this case is evident. In the second case, in view of the long history and repeated examinations of the esophagus, the lesion appears definitely to be that of a true polyp. It is of interest to note that radon

seeds implanted into a polypoid mass had little effect in causing any diminution in size.

SUMMARY.

Two cases of polypoid tumors of the esophagus are reported. The difficulty in arriving at an accurate diagnosis is discussed. In all cases of polypoid lesions of the esophagus, malignancy should be suspected until definitely ruled out.

REFERENCES.

1. VINSON, P. P., and KENNEDY, F. S.: Association of Benign and Malignant Lesions of the Esophagus. *Amer. Jour. Med. Sci.*, 186:660-665, Nov., 1933.

2. DYKE, S. C.: *Jour. Laryngol. and Otol.*, 13:588, 1927.

3. PATTERSON, E. J.: Benign Lesions of the Esophagus. *Ann. Otol., Rhinol. and Laryngol.*, 41:942-950, Sept., 1932.

4. CHITTY, E. C.: Esophageal Polyp Accompanied by Tumor of Accessory Thyroid Gland; Case. *Brit. Jour. Surg.*, 26:193-197, July, 1938.

5. EWING, J.: Neoplastic Diseases. 1922.

Presbyterian Hospital.

SOME PROBLEMS IN NASAL PLASTIC SURGERY.*

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I shall not attempt at this time to discuss some of the more or less routine nasal plastic procedures, but will, however, take up some of the problems that still confront us.

The skin of the lower half of the nose differs from any other skin, in that it is extremely rich in sebaceous glands and is somewhat rugged in appearance, which makes it very difficult to match both in texture and color with unexposed skin when replacing losses in this area. Large skin losses are usually replaced by using a pedicled forehead flap, but such flaps are not practical for small tip losses and in many instances are too thick to produce the best result.

Free grafts to the nasal tip were formerly rather hazardous because of the difficulty in maintaining a fixed and proper pressure over the graft;[1] however, this has been overcome by using the suture pressure method. To use this method, each suture that is used to hold the graft in place is left about three inches long, and when it is completely fixed these sutures are tied over gauze to produce the proper pressure. There may be some cupping of the grafted area but this usually levels itself off after a period of a few weeks. Our experience has shown that the grafts take more successfully when they are kept moist with saturated boric or normal saline solution than when left dry. The gauze is moistened twice daily with the solution, at either room or body temperature but never hot.

A good source of free grafts for small skin losses about the nasal tip is the postauricular area because this has the best color match. Fig. 1 shows a basal-cell carcinoma of the nasal tip and its repair after excision of the growth and the covering of the resulting defect with a full-thickness free graft from the posterior surface of the right ear. The postauricular surface was chosen because it is an exposed area and the defect after removal of the graft is inconspicuous.

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Fig. 1.

Fig. 2.

When removing small pieces of skin, the area can be closed after undermining; however, when large pieces of skin are removed it is necessary to repair the postauricular defect with a second graft from elsewhere on the body, usually from the inner aspect of the thigh, in order to avoid distor-

Fig. 3.

tion of the ear. Another excellent source of free full-thickness skin grafts for nasal tip repair is the upper eyelid, where as much as half of the skin may be removed and the incision sutured without any disturbance of function and very little, if any, visible deformity.

Losses of the nasal tip may be due to removal of a portion for carcinoma, either basal- or squamous-cell in type;

destruction by chemical or physical agents; or traumatic, such as automobile injuries, burns and bites, human or animal. Human bites are very difficult to treat because there is usually considerable infection following bites of this sort and wet dressings are usually used to clean up the injured area before attempting repair.

Fig. 4.

After removal of a portion of the nasal tip for extensive basal or squamous-cell carcinoma, it is well to wait a year before attempting plastic repair. In second degree burns of the face, where there is destruction around the nasal tip, Thiersch or epithelial grafts are frequently used because this type of graft more nearly matches the surrounding skin in color and texture. Fig. 2 illustrates the repair of partial loss of each ala by using a hinged flap from the side of the nose

to furnish the lining, and then covering the entire defect with an epithelial graft.

For columellar losses, it is frequently necessary to use a small pedicle graft, usually tubed, because in most instances we have to replace subcutaneous tissue as well as skin.

Fig. 5.

Fig. 3 illustrates the replacement of a columella loss by use of a small tubed pedicle graft taken from the inner aspect of the left arm.

Cartilage and bone are the best sources of material for building up large losses of the nasal ridge. Pickled cartilage is now being used successfully and this considerably simpli-

fies the repair of such cases. Pickled cartilage is easy to obtain and is not so apt to curl after it is placed in the nose. At times we must use a combination of grafts to repair a given condition, and Fig. 4 illustrates the repair of the nasal ridge by means of cartilage grafts and the repair of the

Fig. 6.

glabellar defect by utilization of a dermal graft. A dermal graft is made up of the dermal layer of the skin. The epithelial layer is removed and discarded before implanting the dermis.

Fig. 5 illustrates the use of excess bony and cartilaginous substance to repair a defect in the glabellar and left frontal

region which followed an operation for acute frontal sinusitis complicated by osteomyelitis.

In our experience, hypertrophy of the tissues of the lower half of the nose are more difficult to reduce than a simple bony hypertrophy. In certain cases, one must excise portions

Fig. 7.

of both upper and lower alar cartilages to produce the desired effect. Fig. 6 illustrates a case of hypertrophy of the cartilaginous structures of the lower half of the nose, and this was corrected by excision of approximately one-half of each upper alar cartilage and about one-third of each lower alar cartilage, as well as a portion of the septal cartilage. The management of the generalized hypertrophied nose is fairly

well standardized but it is well to bear in mind that one must slightly over-correct in elevating the nasal tip because there is a tendency for this portion to sag somewhat following operation.

Fig. 7 illustrates the correction of the hypertrophied nose, and at the time of operation the tip height was over-corrected and this established itself to a normal position in a period of about two months and has so remained.

In conclusion, may I again stress the importance of matching, as nearly as possible, the color and texture of each graft to that of the surrounding skin of its host.

REFERENCE.

1. STRAATSMA, C. R.: Plastic Repair of Partial Losses of the Nasal Tip. *Ann. Surg.*, May, 1930.

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ARE UNWISE EFFORTS BEING MADE TO CONNECT THE AVENUE OF INFECTION IN POLIOMYELITIS TO TRAUMA FOLLOWING ADENOID AND TONSIL OPERATIONS?

DOES AN UNKNOWN PORTAL OF ENTRY, UNCERTAIN INCUBATION PERIOD AND DEBATABLE STRAIN OF SO-CALLED FILTRABLE VIRUS WARRANT ANY SUCH ASSUMPTION?

DR. HENRY G. LANGWORTHY, Dubuque, Iowa.

In view of the fact that we have been reading lately, in an increasing number of medical journals, as well as an occasional editorial, articles purporting to show a definite relationship between tonsillectomy and adenectomy and epidemics of acute anterior poliomyelitis, it is time for otolaryngologists to ask bluntly, where are the proofs? In a letter published in the *A. M. A. Journal*, Sept. 9, 1939, p. 1052, the author of this paper wrote as follows:

> For some time past I have noted with real concern the articles of a few medical authors, to attempt to connect the avenue of infection of poliomyelitis, at present unknown, with the surgical removal of adenoids and tonsils. To foster such ideas directly or indirectly, which long experience on the part of practically all nose and throat men over the United States in no way bears out, is to do great harm to countless children who need such removal. Considering that operations for tonsillectomy and adenectomy number possibly one-fourth of all major operations performed yearly in the country, and under all sorts of varying conditions and circumstances, one could well promote almost any idea, however untrue or remote, by citing the occurrence of a few sporadic cases. The importance of the removal of adenoids and tonsils, when necessary, is so important in the welfare of children that attempts to raise doubts and issues not clearly proven is to do a great harm rather than good. Because a few cases of poliomyelitis occurring in summer time may have appeared after any operation, whatever that operation might accidentally be, is no reason whatever to raise the bugaboo of doubt and fear against it. If there is an epidemic of poliomyelitis in one's own community, any wise physician under these exceptional circumstances should easily recognize what is best to do with children in general. The summer time, by and large, during the long vacation period, is a very good time for the removal of tonsils and adenoids in school children and should be consistently encouraged.

In reading over some of the latest widely scattered reports appearing under such headings as, "The Occurrence of Polio-

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myelitis Following Tonsillectomy," "Experimental Poliomyelitis by the Tonsillopharyngeal Route," "Reports of Recent Epidemics," etc., the evidence of a clear relationship between throat operations, *per se*, and poliomyelitis is not convincing in any of them. The trouble is that many authors write only about those severe epidemics in a community which most physicians will see but once or twice in a lifetime. Procedures under such extraordinary conditions do not take into account that there are some cases with us always. According to Stimson, even in a bad epidemic, there is less than one chance in a thousand of a child developing poliomyelitis.

Not so very long ago in a certain town a short time before school opened, there were a group of underprivileged children with various ear, respiratory, neck-gland and other troubles, all badly needing the removal of adenoid and tonsils. One of the leading physicians, because of two cases of poliomyelitis in the county and a reported mild epidemic in a near-by city, raised "a hue and cry," first, about its being sure to spread to them and, second, about the dangerous relationship of tonsil removal to developing poliomyelitis. The lay organization dropped the project and the money to be devoted to the purpose was unfortunately spent for other things. Did this doctor inadvertently do an unestimated injury to this rather large group of cases? My answer would be in the affirmative.

Some of these examples before us clearly make the issue one of practical experience versus suggested theories of origin by research physician, to cover their inadequacy in findings either an exact etiology on portal of entry. Failure to discover the mode of transmission is no good reason for casting suspicion on most everything that occurs, particularly tonsillectomy and adenectomy in children. Even the laboratory and animal experiments, if I may be permitted to believe the research men themselves, do not seem to bear out the adenoid and tonsil operation trauma entry theory very well but rather the reverse.

It is not often that an established operative procedure like tonsillectomy and adenectomy, with its wonderful record over the decades, needs any words of protection from serious charges without unassailable proof, but the situation created by the poliomyelitis writers actually seems to be one of them. We do not want to be carried away by suggestion only and

tailspin into the hysteria which often takes place in a community when two or three cases of poliomyelitis have been found and diagnosed. As compared with the casualties of burns, swallowing of chemicals, automobile accidents, blindness, etc., the few cases of poliomyelitis about the country pale into insignificance except for the unfortunate victim and parents. Research workers can hardly expect unqualified acceptance of all their theories, and especially their latest about the tonsil, when there are many missing and puzzling links. Fortunately, through the grants and foundations already established, the investigations will continue. Even a somewhat critical article such as this one asking for proof acts as a challenge to place investigators upon their mettle.

It seems to the writer that not enough attention has been paid to the important yet unknown incubation period in many of the articles bearing on this subject. The incubation period of such a systemic disease, while commonly given as seven to 12 days, is believed in some cases to be as long as three or perhaps four weeks. Much can happen to children during a few weeks in warm summer weather. It is understandable that during an actual epidemic, a tonsil and adenoid operation, performed during the unsuspected predominal stage, might easily, because of the close anatomical relation of structures, such as the olfactory nerve, bulb and tract, accentuate inflammation or infection, if it happened to be present at that point. One is extremely skeptical, however, of much of the so-called evidence presented for virus pathway, principally through the nose, because it seems to be just a rehash of what others have dished up, without added evidence.

Where can we go for some suggested facts in this disease? The answer would seem to be in autopsy findings. What does autopsy show? Autopsies performed on individuals who have died as a result of poliomyelitis have generally failed to show lesions in the olfactory bulb. This suggests at once that there are other more important portals of entry to be considered. According to Trask, since poliomyelitis virus can be so readily isolated from patients' stools, and only with great difficulty from the nose, it becomes almost necessary to consider poliomyelitis as an "intestinal disease." In support of his contention, autopsies have revealed the lesions in the intestinal tract and the virus has been recovered from mesen-

teric lymph glands. Toomey, of Cleveland, also makes the same claim for the intestinal tract. The seasonal appearance in summer or early autumn in the north may be, and probably is, an analogy to typhoid fever rather than insect inoculation.

What has been the preventive value of large-scale co-operation by specialists relative to the use of nose and throat sprays and douches? Where tried they have so far proven of little real value one way or the other. The best preventive in poliomyelitis epidemic times is still to keep children at home, away from crowds and carefully watched.

Quite a number of years ago, my daughter, Adele, during the progress of an epidemic in Dubuque, became slightly indisposed. Seen by Dr. E. C. Rosenow, of Rochester, Minn., it was pronounced to be a slight case of poliomyelitis but without the paralysis. She had played right along with another youngster, also a doctor's child, who died from the affliction. Not one of all the other children of the neighborhood, who romped with the one that so promptly died, had any trouble whatever. Dr. Rosenow is still, to this day and in a remarkable way, persistently and intensively investigating the angles of this very baffling disease.

In conclusion, it may be said that present evidence, such as it is, leaves the nose and throat worker master of the headfield and free to use his own best judgment. He will, of course, be cautious indeed about operating at all in the midst of one of those rare but actual epidemics in his community. Outside of this natural and well-accepted stipulation, he should be relatively uninfluenced by mere doubt and fear on the part of others. When more certain facts than these have been collected, the otolaryngologist will be the first to accept truths that can be clearly demonstrated to the general satisfaction of the medical profession.

BIBLIOGRAPHY.

1. Sabin, A. B.: Experimental Poliomyelitis by the Tonsillopharyngeal Route with Special Reference to the Influence of Tonsillectomy on the Development of Bulbar Poliomyelitis. *Jour. A. M. A.*, p. 605, Aug. 13, 1938.

2. Aycock, W. Lloyd, and Luther, Elliot H.: The Occurrence of Poliomyelitis Following Tonsillectomy. *N. Eng. Med. Jour.*, Jan. 24, 1929.

3. Eley, R. Cannon, and Flake, Carlyle G.: Acute Anterior Poliomyelitis Following Tonsillectomy and Adenectomy with Special Reference to the Bulbar Form.

4. STILLERMAN, MAXWELL, and FISCHER, ALFRED E.: Acute Bulbar Poliomyelitis Following Recent Tonsillectomy and Adenectomy. *Amer. Jour. Dis. Child.*, Oct., 1938.

5. FISCHER, ALFRED E., and STILLERMAN, MAXWELL: Acute Anterior Poliomyelitis in New York in 1935; A Review of 686 Cases. *Amer. Jour. Dis. Child.*, Nov., 1937.

6. FELDERMAN, LEON: Acute Anterior Poliomyelitis with Special Reference to Its Rhinological Aspects. THE LARYNGOSCOPE, Nov., 1938.

7. KING, L. S.: Some Problems in the Pathology of Neurotropic Viruses. *Jour. A. M. A.*, Nov. 25, 1939.

8. KOSKOFF, Y. D.; AMSHEL, J., and LEBEAU, S.: Bulbar Poliomyelitis Following Tonsillectomy and Adenectomy; Report of Two Cases. *Arch. Pediat.*, Jan., 1939.

9. LANGWORTHY, H. G.: Poliomyelitis and Tonsil Operations. *Jour. A. M. A.*, p. 1052, Sept. 9, 1939.

10. STIMSON, P. M.: Poliomyelitis. THE LARYNGOSCOPE, Jan., 1940.

11. ROSENOW, E. C.: Further Results in the Treatment of Acute Poliomyelitis with Antistreptococcic Serum. *Minn. Med.*, March, 1940.

12. Poliomyelitis and Tonsillectomy, *Jour. A. M. A.*, p. 877, Sept. 7, 1940.

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BOOK REVIEWS.

Handbook of Hearing Aids. By A. F. Niemoeller, A.B., M.A., B.S., author of "The Complete Guide for the Deafened." With Foreword by Harold Hays, M.D., F.A.C.S., author of "The Modern Conception of Deafness." Harvest House, New York, 1940.

This small manual was written to supply the hard-of-hearing patient with pertinent information about hearing aids. It is a straightforward discussion of all phases of the subject and clearly explains advantages as well as disadvantages of the various types of hearing aids.

Many practical hints and suggestions are given, such as sources of used and rebuilt outfits at a much decreased cost, the value of battery recharges, the building of homemade sets, etc. For those who are interested, quite some space is devoted to the mechanism involved in the amplified and unamplified instruments.

To the otologist who would intelligently prescribe, fit and check hearing aids, this is a very helpful volume. Although, of necessity, it does not include technical otologic and acoustic detail, the very valuable advice regarding hearing aids makes it a desirable volume for ready reference. B. H. S.

Otology, Rhinology and Laryngology. By Howard Charles Ballenger, M.D., F.A.C.S., Assistant Professor of Otolaryngology, Northwestern University School of Medicine, Chicago. Illustrated with 90 engravings and four color plates. Philadelphia: Lea and Febiger, 1940.

This, in the words of the author, is an attempt to write a "small, concise textbook on diseases of the nose, throat and ear." It is prepared for the undergraduate medical student, general physician and nurse; consequently, theories, questionable treatments and surgical techniques are omitted from this manual.

Within the limits set by the author, the book fulfills its purpose. Included are many instructive and interesting illustrations and plates, most of which have appeared in the previously published and more comprehensive textbook. The manual is divided into four well defined parts and is clearly subdivided into chapters which make for ready teaching and easy accessibility of material; however, more clarity, simplicity and accuracy of description is needed by some sections; e.g., the description of the anatomy of the neck.

Such a manual has definite value for the nonspecialist student and is recommended for use in undergraduate teaching. B. H. S.

DIRECTORY OF NATIONAL OTOLARYNGOLOGIC SOCIETIES.

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Chairman: Dr. LeRoy A. Schall, 243 Charles St., Boston.
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